

Australian Journal of Education and Science



№1(17), January-June, 2016

“Sydney University Press”
2016



The University of Sydney

Australian Journal of Education and Science

№ 1. (17), January - June, 2016

VOLUME IX

**"Sydney University Press"
2016**

Australian Journal of Education and Science, № 1(17), (January - June). Volume IX.
“Sydney University Press”, 2016. - 633 p.

Proceedings of the Journal are located in the **Databases Scopus.**

Source Normalized Impact per Paper (SNIP): **4.572**

SCImago Journal Rank (SJR): **4.235**

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ISSN: 0004-944X

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Economics

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The Shipping Marketing Strategies within the Framework of Complexity Theory

ABSTRACT

This paper examined the shipping marketing strategies within the framework of complexity theory. Then using prevailing models in both services marketing and complexity theory, core elements like dynamic life cycle of products and industries, strategy, leadership, team-work as well as safety and security culture are presented. Shipping industry is in this paper contrasted and compared with other service industries for peculiarities that exist and make this industry unique for business-to-business marketing. Analysis is based on case studies of leading shipping companies of bulk and liner markets.

Keywords: shipping marketing; chartering; leadership; shipping marketing mix; complexity theory; shipping marketing strategy; differentiation strategies; positioning strategies.

1. INTRODUCTION

As it is well known, Marketing delayed [1] to be applied to service industries compared with that of products. Additionally, Marketing much delayed to be applied to Sea Transport Industry. This happened par excellence and especially to the Ocean going ship-owning companies - with the exception of Cruising where hotel marketing has indeed been earlier – in 1972 - applied to the ships i.e. the sea traveling hotels. The present research [2] revealed for the first time we believe that the implementation of marketing into shipping industry was not as extensive as in other service-

industries like e.g. air transport (appeared in 1971). Panayides tried to apply marketing to ship management companies (companies which manage third party vessels) using the approach of relationship marketing [3], concluding that the adoption of contemporary principles of marketing will assist companies in the achievement of their key objectives and that marketing is essential in professional ship management as mostly deals with clients. Frameworks, concepts and strategies indeed have been developed to address the fact that services marketing is different vis-a-vis packaged goods and manufacturing [4]. However as presented by Kasper [5] from the 25 studies appeared between 1992 and 2001, only three focused explicitly on market orientation and services. Conclusively, Services Marketing is still under the process of a continuous evolution and change. Marketing early in the decade 1980-90 followed a prominent research on service quality [5], but the emphasis has by now shifted to the process of creating value for the customer. In this paper, the current shipping industry situation is investigated and the application of the long celebrated Marketing-mix to Shipping Industry is analyzed. This will be connected with sustainable leadership as it stands in the Marketing Science, but also and especially as leadership is understood by Complexity theory. This paper is designed to deal with 3 subjects in both the sciences of Marketing and Complexity theory: (1) Strategy, (2) Leadership and (3) Marketing-Mix. For working purposes the sustainable marketing leadership is defined as the process of influencing a group/company towards the achievement of marketing goals in a permanent / sustained way.

2. ANALYSIS

2.1 Marketing Models in Services

First, Kotler [1], with bank services in his paradigm, was not able to grasp shipping industry's peculiarity. In shipping, the customer does not see either the physical environment or the contact personnel, before hiring the service, as the hiring is done via brokers from both sides who act as salesmen. Secondly, Zeithaml and Bitner [4] drew attention to experience and even credence qualities. Ships are indeed experience goods and provide credence qualities especially safety [6]. According to Kotler [1] the services marketing strategy means: (1) external marketing, (b) internal marketing needed for employees motivation and (c) interactive marketing. This is the known 'Services triangle - a strategic framework-attributed to Gronroos [7], in effect

emphasizing that (external) marketing is about making promises, (internal) marketing is about enabling promises and (interactive) marketing is about keeping promises (reliability). The above although a rather native construction is useful to see that the providers of service are firm s employees, subcontractors, outsourced entities, agents, or what stands for 'People in the marketing-mix. Good, but obvious, is also the emphasis given by internal marketing to recruiting, training, motivating, rewarding and providing equipment and technology. Real-time marketing is the time of truth. Promises are kept or not. The defect of this analysis is the absence of any safety and security concern [8] of paramount importance for shipping and ports. Third, Zeithaml and Bitner [4] argued that services should be viewed in a structured and integrated way. The four gaps are: (1) know what the customers expect, (2) select the right service designs and standards, (3) deliver to service standards and (4) match performance to promises. But, these four gaps include many key factors (Table 1).

Table 1. The integrated gaps model of service quality

Gap 1: 1. Inadequate marketing research orientation.	2. Lack of upward communication.	3. Insufficient relationship focus.	4. Inadequate service Recovery.
Gap 2: 5. Poor service design.	6. Absence of customer-defined standards.	7. Inappropriate physical evidence and servicescape.	
Gap 3: 8. Deficiencies in human resource policies.	9. Failure to match supply and demand.	10. Customer not fulfilling roles.	11. Problems with service intermediaries.
Gap 4: 12. Lack of integrated services marketing communications.	13. Ineffective management of customer expectations.	14. Overpromising.	15. Inadequate horizontal communications.

Source: Zeithaml and Bitner (2003: 531). Kotler (1994) mentioned 5 gaps, while above have been reduced to four

The authors of the above theory talk about effective services marketing and a framework for understanding and improving service delivery and a way of positioning the key concepts, strategies and decisions in services marketing. Thus starting with the customer and closing the gap between customer s expectations and perceptions. Indeed, some of the above factors apply to shipping but only as an aide de memoir, but safety and security are nowhere mentioned. In addition, lack of team work must be accepted as a fact in Greek shipping rather than something to be eliminated. Supply and demand in shipping cannot be matched by the actions of the individual firm; education of customers is not possible. This model is indeed an aide de memoir,

and it is not a model of success. The analysis provided by marketing is most of a consulting philosophy and planning and success is not in any way guaranteed, and thus is not yet persuasive for a shipping firm, a par excellence profit seeking/making enterprise. Success in business according to Berry [9] is rather attributed to 8 drivers: exceptional excellence, control of destiny, trust-based relationships, generosity, investment in employee success, acting small, brand cultivation and strategic focus. This is the way of building a lasting (sustainable success) service businesses. These may lead to customer satisfaction, innovation and growth. This is clearly a panacea model indeed.

3. STRATEGY

3.1 Marketing Strategy

As argued, a marketing strategy alone is not enough if it is not transformed into marketing programs, as this is a practical science. Therefore, basic decisions must be made on three essential pillars shown in Diagram 1.

Marketing-mix is characterized as one of the key concepts in modern marketing theory. There is also an optimality condition-not specified though-in the mix as far as the 4 etc P's are concerned [4]. Marketing mix is characterized as a powerful concept. Kotler [1] has established that the marketing strategies can be considered as the means of a company to achieve its marketing objectives related to marketing-mix. Three strategies are suggested by Kotler [1] based on Porter [10]: overall cost leadership, differentiation and focus. Tramp Shipping companies indeed pursue overall cost leadership as they are compelled to do so where price is an out of control variable. This however does not bring in more customers, but only provides survival. In differentiation, indeed safety and security leadership is pursued by tramp shipping companies, too. According however to Zeithaml and Bitner [4] based on analysis of some 60 studies on service success the most dominant and reliable predictors of success relate to strategy characteristics i.e. dedicated human resources to support, and dedicated R and D on, the so called initiative. Moreover, [11] market orientation has been defined as a strategy used to reach a sustainable competitive advantage.



Diagram 1. The role of marketing-mix in marketing strategy

Source: Inspired by Kotler (1994:98-99)

3.2 Strategy in Complexity Theory

In marketing science, emphasis is given to planning, without strategic thinking though to precede. Marketing planning is only a practice and should be concerned with ensuring that action is consistent with the original intention; is a design methodology as well as a practice, which should create a structure for fulfilling ideas being perfectly in line with the principles of the original intention. Strategic thinking on the other hand attempts to understand the nature of things and to create the opportunity to respond to current circumstances and actions in such a way that the future created far exceeds any other future. Strategic thinking is imperative in providing first a theory capable of approaching today's world [12] and then to be seen as workable by: testing, providing the right questions and leading to a new theory through information, if it is necessary to replace the old. Theory coexists with strategy and strategic thinking, and planning can only then begin. The usual mistake in marketing is in using exhortation in place of strategic thinking. Marketers must realize that strategy is a process of profound original thinking about the company and its relationship with its environment and is only this company, which will be gaining an enormous marketplace advantage. Successful strategy is what generates the future as much as it predicts it. "Only a very small % of companies have a strategy that is understood and respected by employees or the public". Most companies are faulted for lack of originality, lack of clarity, or lack of understanding both of business and of marketplace; lack of match between action and resource allocation with regard to what is said to be the strategy. A strategy has to get operationalized into practices and adopt processes based on: Quality (safety and security for shipping) past experience

+quality (safety and security for shipping) client (charterer) experience +quality (safety and security for shipping) business practices = future. As strategy should provide information, important is to recognize the 'distributed processing philosophy. Firms must be aware that economic profitability is a function of time and of competitive advantage, but competitive advantage suffers from life cycle phenomenon, too and must be reinforced by another and so on and so forth. In all marketing sources, it has been encountered in place of strategy, a long list of plans and intentions, all producing complicated expressions resulting in chaos instead of in self-organization of complexity.

4. LEADERSHIP

4.1 Leadership in Marketing Science

Kotler, [1] argued that leadership deals with facing out change. Alternatively, Kasper [5] mentions as better the female way of leadership, i.e. social interaction, interest in employees and care about people. Leadership in organizations is defined as that it makes things happen. MacKenzie et al. [13] applied the traditional definition of leadership to sales-people and argued about the obvious which is that a leader must inspire sales forces to outperform. Complexity theory as presented below is more sustained than this simple rule. Moreover, Harris and Ogbonna [14] stepped over the traditional path of leadership by referring to participative (appeared in 1973, with changes in 1988 and 2000), supportive (appeared in 1971, based on motivation) and instrumental types. They found that only the first two types are positively associated with overall market orientation (=customer, competitor and interfunctional coordination). These authors have not applied the achievement-oriented leader which is the fourth leadership behavior [15]. Thus marketing falls behind advances in Management science. Berry [9] moreover argued in favor of values-driven leadership. It infuses its values into the fabric of the firm leading with a set of core values; what the firm represents and aspires to be. These values should tap into employees own core values and guide individual decision making and inspire personal achievement; leaders mobilize emotional and spiritual resources; people at work often have more of themselves to give and they must have a cause not just a job. Leaders articulate company's reason for being (the dream); convey company's fundamental aspiration and why they are important, but also the meaning of the success (speaking and acting). Business effectively requires the sustaining power of values-driven leadership;

keeping performers performing at a high level in a continuous fashion. Shipping indeed although is not a labour intensive industry, personnel on board and especially Captain is of paramount importance. As also argued by Kotler [1] many industries contain one firm that is the acknowledged market leader. Moreover, the firm that has the largest market share is leader also in: 1. Price changes, 2. New product introduction, 3. Distribution coverage and 4. Promotional intensity.

4.2 Leadership in Complexity Theory

In complexity theory [16] leadership is too needed but: (a) helping developing the clear identity of the company, (b) supporting people as they learn how to live by their values and (c) understanding that people is best controlled by concepts that invite participation. Leadership is the one that shows by going first and having the courage of his convictions; one that has theories that determine and guide his actions. There are two reasons for failure in any effort towards any organizational transformation that may be needed to sustain success in the market place: The lack of a theory and of leadership.

Sustained leadership in market success is conceived for companies that fit with their environment, compete within a context of cooperation and create systems that become increasingly complex as evolution requires, while remaining extremely flexible. The influence will be done in shipping via cost minimization, and newbuildings, but these are the required abilities to be acquired in a mastery way for dominance in the marketing game, and for survival or else for death. The exceptional leader must have exceptional thinking, exceptional increase in information and exceptional creativity. The organization of the company must be able to organize the indicated requirements. The way to build a future success is presented in Diagram 2.

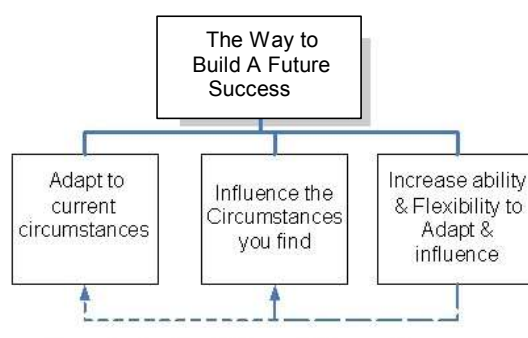


Diagram 2. The way to build a future success

5. SHIPPING MARKETING MIX

Shipping industry is here defined as the industry serving sea transportation needs for cargoes: (a) with no pre-advertised itineraries (tramp shipping), but also (b) for cargoes with predetermined and regular round the world services to shippers (liner shipping). Marketing objectives are related to marketing-mix. Marketing mix is not a static, but a dynamic tool, as it implies an optimal combination of the P's for a given market segment over time [17]. In addition Time and Place-apart from making the mix dynamic - are equally important in shipping. This means that at another point of time, a different mix has to be applied. But is it possible to make marketing tools dynamic? Yes. Diagram 3 depicts the life cycle of a product becoming dynamic. It should be mentioned that, there is nonlinearity at the strategic marketing level [18].

As shown in the above 'full Descartes quadratic diagram-using rates of change than absolute amounts of profits and sales-at the introduction of the product both sales and profit rise, and as the product is more accepted into the market, the sales and profits improve (growth area). Decreases in rate of growth in profits (but not sales) lead to shakeout. The maturity comes when the trajectory enters into the 4 th quadrant on the phase plane as both sales rate of rise and growth of profits decline, while sales may continue to rise. The decline stage comes when the trajectory gets into quadrant 3 where both sales and profits decline. The factors that have caused the above clock-wise pattern are: (a) the production capacity, (b) the size of the initial promotional budget, (c) the acceptance rate of customers, (d) the reaction of the competitors, (e) the available substitutes and (f) the efficiency of the product's distribution channels. Many of the above obviously belong to Marketing mix. Marketing professionals know e.g. that prolongation of the maturity stage may be followed by, for example, multiple products uses or making it ecologically safe or even by other methods thus extending the life of the product/service. In addition, the marketing-mix must be distinguished between short and long run. Advertising, price and sales force e.g. can be modified in the short run in all industries (assuming short run of a time length over 2-3 months for shipping). In shipping, freight rate/price cannot be modified either in the long run or the short run at the whim of the firm and in the case of liners prices were only steadily increasing in the past. Advertising in liners can be increased in the short run, but the number of agents is much more difficult to be increased in the short run. There is also a complexity element that the 4 (or 8) P's are interrelated and depend one on each other to a certain extent. Kotler [1] argued

that the marketing mix is in effect a sum of marketing tools used by the enterprise in order to achieve its objectives in the target-market. For tramp shipping however the P-price - is not a controllable decision variable and this must be noted. Services however needed an extended/expanded marketing-mix including to the four, three more P's: people, physical evidence and processes. The expansion has taken place in 1981 and included: People, Physical Evidence and Process.

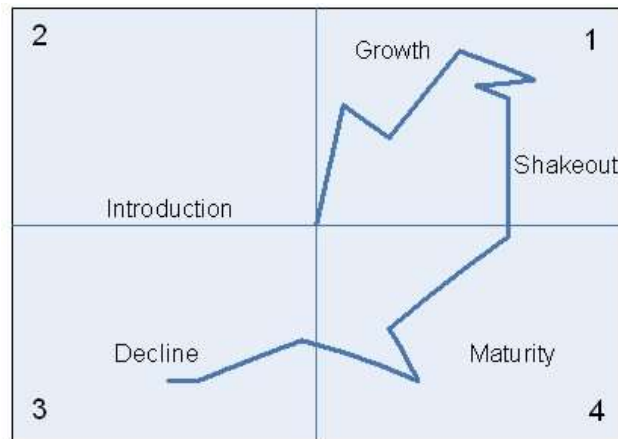


Diagram 3. History of a simulated product in a dynamic life cycle

Source: Modified from Priesmeyer (1992:92)

In shipping marketing-mix it should be taken into consideration the time as a factor making it dynamic. In shipping marketing the customer is the owner of the goods transported. A shipping company is a profit-maximizing company, especially through the effective reduction of costs, in selling services at a more or less given price (price taker). But, satisfying user's needs presupposes not only correct diagnosis of charterer's/shipper's transport needs, but also the appropriate organization, planning and control of the means of those providing the transport means [19]. Shipping in particular is very sensitive in control, communication and coordination from distance as the factory/vessel is far away. The ship "is the company. A shipping company is a multi-company/multi-factory corporation in case there is more than one ship. Obviously, the shipping company has to find out charterer's needs, to adapt chartering and operations policies as well as safety/security requirements to satisfy such needs. This with a view to offer the required transport services as demanded by the user at a profit, whenever possible, given the shipping

and business cycles. The transport price i.e. freight, is something negotiable, but within the framework of total supply and demand in case of tramp shipping. Eventually shipping companies realized that they must communicate effectively with their customers in their endeavor to build out a long-lasting commercial operation of its vessels. Given however that the ship is built by the first-owner with a trade in mind and a customer in focus, the second-owner has certain marketing restrictions to face, given that the ship is called to serve other trades/customers than those to which has been originally designed. Thus, all shipping enterprises seem to have fixed capabilities as far as the means, the resources and the management abilities of their ships, are concerned. This leads to the lack of perfect adaptability of a ship to the customer's needs, with the exception of ships built under contracts of affreightment. This fact introduces a case of limited ability for the ship to be able to exploit all challenges of the shipping market with equal effectiveness and here marketing may be considered helpful. Tramp Shipping services unlike liners at the end are broadly considered homogeneous.

There is no doubt however, that the matching of the capabilities of the shipping enterprises with the needs and the desires of the charterer is fundamental for the sustained provision of the required transport services. Moreover, this is essential for the satisfaction and 'loyalty' of the user and as a result a prerequisite for the commercial success of the shipping enterprise [20]. Thus, a shipping company must organize its resources in such a way that the stages of the marketing process can be applied and by this way, a long-lasting and profitable operation of its ships can be achieved. The application of a marketing system requires a selection of the appropriate marketing policy and an undertaking of specific activities, with continuity and periodicity. The most appropriate marketing policy for a shipping enterprise is the target marketing, which assists shipping enterprise to concentrate its efforts to the most promising opportunities [21].

Primary information was collected through a quantitative research undertaken to the leading tanker and liner shipping companies in the world. In accordance with the above-mentioned research the shipping marketing-mix consists of the following 8 P's [22]:

- (1) The Product-Service is the basic element of the mix. The firms when introduce new services in the international market they face many challenges as consumers are not very aware of the quality of new services or they have little

knowledge about the firm reputation and image in the market [23]. This is offered to the market and its safety/security is in the focus of many organizations for the last seven years. The liner services have the peculiarity to be involved with too small cargoes for filling-up the entire capacity of the ship and they must be grouped out/containerized with other cargoes. The liner ship operates in regular pre-advertised services between certain known ports carrying cargo at fixed prices for each commodity, where discounts can be offered only to regular customers. The transport of a multitude of small goods on a regular service obviously faces the liner operator with a more complex and extensive administrative task than the one facing the bulk/tramp shipowner. Indeed, the bulk shipping branch of industry provides different services than the liner shipping branch using shiploads instead of small cargoes in containers. Here several and different bulk cargoes may be carried by a single ship, where a load may occupy a separate hold or a part of a hold. This is the traditional tramp practice without regular services and predetermined routes. The safety of shipping services as mentioned already is since 1998 legislated in ISM Code and is compulsory and demands conformity with this international safety standard that seeks to protect sea environment as well. Security of ports and ships is again a compulsory service feature legislated in 2004. Shipping companies will probably sell these features using marketing techniques. This first P - the service - is not a single variable but includes many other features like safety and security. In effect, in shipping services the design of the vessel is not a direct marketing feature unlike speed (which in turn may depend on design). Packaging is too irrelevant, while the brand name may be related to what we call as the identity of 'good operator' and refers to the ship-owner. The sizes of the vessels however are essential marketing tools as this feature determines along with place (ports) and time the suitability of the vessel to attract the customer from other competitors the ships of which may be found in the same port or near-by. Time is a unique feature in shipping that may be not found in the variable 'Place' as defined by marketing science. The job in shipping is secured by those ships that are found in the right place at the right time and have the right type and size.

(2) The Price-Freight: in all sectors of the tramp shipping market the agreement between the parties involved (normally represented by their brokers - within the supply and demand framework - is carried out by negotiations given the specific requirements of the particular transportation from port to port. The characteristics of this market are the frequent and unpredictable marked fluctuations of the price of

transport determined by changes that occur in supply and demand. As far as the liner market is concerned, the freight rate remains for a long time steady and is determined by the transport companies although elements of competition is introduced in later years in another times cartel (shipping conference).

(3) The Process: the process that we may identify here in shipping marketing mix is that of the stage of negotiations on the one hand and the execution of the agreement (charter party) on the other. This process can be described as follows: first a cargo is sold by the producer to the merchant/importer for further sale etc., secondly the charterer's broker seeks the appropriate vessel to transport this cargo, the owner's broker thirdly negotiates the terms and conditions of the transport contract providing the suitable ship for the situation. This whole process leads to the signature of the final charter party. So, in this situation the Marketing of the cargo holder acts first for the sale of a produce to an overseas merchant. This agreement-charter party - is then passed from the Sales department (Chartering) to Production Department (Operations) to be executed to the full satisfaction of the shipper and under the protection of the environment. This stage contains distribution and production in one.

(4) The People: people is of course one of the basic live means to provide the transport services to the charterer and the human element is very crucial for shipping especially on the ship. The manager of the ship / the Captain acts in great distances from the shipowner/shipmanager. And one may note the high capital/labour ratio (in an ecological new tanker the ratio is 2 m \$ per head) in shipping. People/operators also supervise the crew from the office and a person is now established in the shore office called 'designated person ashore' accountable for the safety of the ship and the cargo. The crew also makes the public relations with the representatives of the customer (charterer) and especially in time charters (longer in time) where the role of the charterer is more active in production. The office and the ship's crew have to be capable and effective in providing worthy work and in possessing psychological maturity for the smooth operation of the vessel and the more effective service. The ship-owning nowadays is an ever more regulated profession as it has to obey to the relevant codes and regulations, standards and instructions published by IMO (International maritime organization of UN), the state authorities of the flag/registration and the classification society and the Port state controls. Thus safety/security is imposed from outside aiming at achieving safety and security and environmental protection and is not paid by the customer/user, unlike of what happens in other

industries. Imposed is also the continuous professional training of the seamen, who have to obtain the skills required, evidenced by relevant official certificates.

(5) The Place (the Ports and Geographical Area): the ship goes to the place where the cargo is provided by the shipper i.e. in the port of loading and she has to carry by sea to where is required by the shipper i.e. in some other port. This in effect is the distribution function, which coincides with production function or stage.

(6) The Promotion: here this item of the shipping marketing mix means the actions that a shipping company undertakes to inform users about the features of its fleet and other basic information concerning the main characteristics of vessels and their potential port/place/time (ETA), where can be found when needed. This is of course an effort towards the charter or hire of the vessel through information as this is the practice e.g. in the newspapers for advertised goods offered in special discounted prices-when and where. Ships are information goods. The non-determination of the sea transport services renders the immediate distribution impossible. In shipping there is nothing tangible to distribute but only to transport and as mentioned distribution and production takes place in a simultaneous way. The cargo is safely distributed/transported to the port specified by the seller. Thus, and especially in liner shipping, the promotion is considered as an effort to show the attributes of the specific offered service by the company. The possible benefits or merits of the ship are tangible to the user as far as capacity/size, speed, port, class, safety and dates are concerned. These attributes and others will convince the user/its broker to commence the negotiations with the shipping company and specify the detailed contract of carriage providing eventual a firm offer or official proposal to the owner of the ship. To inform the shipbrokers of the merits of the ship one may resort to forms of advertising to the specialized press and participate to exhibitions, like e.g. Possidonia, as well as to use the normal communication means and circulars. Advertising is a mean of providing the charterers the required information to decide whether a chartering agreement is worthwhile pursued. Advertising can make the ship and her features (age, maintenance class, speed, equipment and people) known to the potential user. The shipping enterprises possessing service quality must have a motive to reveal their quality through advertising and place their competitors in a disadvantageous position if the latter offer an inferior service quality. A specialized mean of informing the possible user is the so called 'position list' which provides up to date information of the expected time of arrival of all company's ships by connecting

ships to ports once a week. In liner market, advertising can be considered as one of the main factors dealing with non-price competition. Moreover, maritime transport services are considered as 'experience goods' [6], which in effect means that ship services are known to the user as they are used and this experience is the best to know of what is offered and whether a new hire or prolongation of hire will be further pursued or not. Although this is a costly way to find out the level of services rendered, this is the only method to know the ship services from first hand. The satisfaction of the charterer from ships good performance will lead to repetition of charter.

(7) The Physical Evidence: this consists of the ship, where the service is provided and can be called the physical environment. This environment is mainly fixed by ship's name, year of built, flag, cargo capacity, speed, draught, width and length, cargo handling equipment, number and type of holds, and fuel consumption. When the charter party is about to be negotiated, the user has to be sure about her suitability, which means the seaworthiness of the ship to carry out the transportation work. The ship has to be also suitable to carry the specific cargo or being cargoworthy, a term that covers all parts of the vessel and the engine, the supplies and spare parts. In effect the ship owner is obliged to provide a ship built, equipped, supplied and manned so as to carry the cargo in her holds safely to its destination and to be able to face and overcome the ordinary perils of the sea.

(8) The Paperless Trade, may be considered as the eighth P in the marketing-mix, that may reduce time spent for formalities and make the travel faster and thus more productive as more cargo can be transported in the unit of time. This benefits both the user and the provider of the service. Certain aspects are within the control of the industry like electronic mail and Internet while others like EDI is partly in the control of ports. The global information is required at 24 hours especially for shipping which is subject to economic, political, social and other worldwide developments. Shipping moreover is involved in voluminous and time consuming exchange of documents so that it became necessary for the industry to use modern electronic communication means by which time, cost and effort is reduced and perhaps quality of service offered is improved. Electronic trade [24] is a sum of business strategies that can support specific sectors of business activity and practices, which allow, through the use of new technologies, to accomplish commercial processes via electronic means. This trade is applicable to a broad field of shipping activities, apart from trade created over the seas, like the electronic negotiation for chartering a ship, the electronic production of shipping

documents including the bill of lading, the follow-up of ship's movements, the communication of the ship with the office, the charterer, the flow of relevant information, advertising of services, support of charterer and payments. The advantages of the paperless trade for shipping enterprises functional and strategic. The shipping company using EDI provides improved services to its customers/users, maintains better business relations with them and gains a competitive advantage.

Diagram 4 presents the 8 P's of Shipping Marketing Mix.



Diagram 4. The tools (SP's) of shipping marketing mix

Source: Plomaritou 2008b:59-71

6. SHIPPING MARKETING STRATEGIES: DIFFERENTIATION AND POSITIONING STRATEGIES

During the planning of marketing strategies, special emphasis must be given to decisions that concern company's differentiation and positioning for gaining competitive advantage. Once the target market is selected, successful shipping firms establish a differentiation strategy, which sets them apart from competitors in charterers eyes. Success through differentiation demands skills that completely diverse from those needed for cost leadership.

The differentiator wins by offering a transportation service that is unique or superior to competitors. Shipping companies aim to achieve superior performance of a sea transport service, adding value to their offering. One way in which firms seek to gain advantage over their competitors is by providing greater quality service relative to freight than their competitors. Added value can also be achieved by offering

completely new services which are not yet available from competitors, by modifying existing services or by making them more easily available to customers in order to gain a competitive advantage.

The shipping enterprise can differentiate its offer from that of its competitors through the following differentiation approaches [25]:

- **Qualitative Differentiation:** According to charterers and shippers, the quality of services offered includes mainly the reliability, frequency, flexibility and immediacy of service, as well as the safe carriage of goods by sea. A shipping enterprise can achieve a qualitative differentiation with the offer of special services to its client – charterer or shipper - in comparison to the package of benefits that its competitors offer. However this is more important in the liner market than in the bulk market. Thus, as an example, APL achieves a qualitative differentiation by applying an advanced electronic data interchange system (EDI) between the company and the shippers. The system provides the shippers with quick and sound information, while saving effort.

- **Geographical Differentiation:** The enterprise may achieve geographical differentiation with its ability to manage routes, which serve the needs of seaborne trade worldwide. This is a strategy followed by the leading companies of the liner market. An example of geographical differentiation is the case of A.P. Moller – Maersk Group, which possesses and operates the most modern fleet of container ships, managing the largest route network and serving the needs of trade worldwide.

- **Personnel and Crew Differentiation:** In this case the enterprise sets themselves apart by employing the appropriately trained personnel and crew at company's offices and vessels. For example, Clipper Group achieves this by providing crew with continuous development at its training and simulation centres.

- **Image Differentiation:** This is achieved by maintaining the best image of the enterprise to the bankers, insurers, suppliers, agents, charterers or even investors. Tanker Pacific Management, for example, has built a very good image in the tanker market and has the reputation of a reliable and responsible company.

The more effective an enterprise is in differentiating its transportation services from competitors, the greater is its power. The quality, personnel, crew, image and geographical differentiation aim to reduce the competition on freight rates (price differentiation does not apply largely in shipping companies). A shipping company can realistically aim to be leader in one of the above mentioned areas, but not in all at the same time. It therefore develops those strengths, which will give it a differential

performance advantage in one of these benefit areas. A characteristic of the differentiation strategy of a shipping company is that a sea transport service cannot be easily copied due to the high capital cost of vessels. So, a shipping company seeking to differentiate by innovation should not find its innovatory service copied quickly by competitors.

Furthermore, positioning strategy refers to the final selection and choice of target market segment, which describes the clients (charterers I shippers) the business will seek to serve, as well as the choice of differential advantage, which defines how the company will compete with rivals in the segment. In this way, the target market designates what the company is in relation to its competitors.

The appropriateness and effectiveness of the positioning strategy is the major determinant of business growth and profit performance. The positioning process of a shipping company includes the following stages [26]:

- o Firstly, the shipping company must localize the possible differences in its sea transport services compared to other competitive enterprises.
- o Secondly, the shipping company must apply selection criteria in order to spot the most important differences leading to a comparative advantage over its competitors. Many businesspeople prefer the promotion of only one competitive advantage – and no more - in the target market.
- o Finally, the shipping company must show that within its target market it differs from its competitors.

7. CONCLUSION

This paper attempted a specification of the shipping marketing-mix introducing time. The marketing mix of a shipping enterprise activating in tramp or liner market are constituted of the: Product (Tramp or Liner Service), Price (Freight or Hire), Process (Negotiations Procedure and Execution of the Charter), People (Office Personnel and Ship's Crew), Place (Ports and Geographical Area of Ship's Employment), Promotion (advertising programs), and Physical Evidence (Ship's Characteristics and Seaworthiness of the Vessel). The paper also presents the new tool of the shipping marketing mix, which is the "paperless trade. Then using prevailing models in both services marketing and complexity theory, we present core elements like dynamic life cycle of products and industries, strategy, leadership, team - work and safety and security culture. This last element will be the one to occupy

management and marketing science for the time to come as argued. This paper shows that adaptability, flexibility and complexity are the basics for market success. Strategy takes a special track in this paper as new terminology is applied like strategic intent and thinking, defining at the same time the exceptional leader we need. Shipping Marketing as shown falls behind management, and concepts of management like strategy, leadership and culture are used with considerable delay. The novel culture called safety culture and the even more novel security culture discussed in this paper are still ignored by marketing. These play the entire role in shipping as a competitive advantage along with cost minimization. Shipping industry is in this paper contrasted and compared with other service industries for peculiarities that exist and make this industry unique for business-to-business marketing.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Issues in the Management of the Supply-side Financing of Micro, Small and Medium Enterprises (MSMEs) in Nigeria

ABSTRACT

Access to financial credit facilities remains top on the list of constraints affecting the development of MSMEs in Nigeria. This state of affairs subsists despite the nation's robust financial sector. Commercial banks loans portfolio to MSMEs as percentage of total credit to the private sector has been dwindling over time, from 27.04 percent in 1992 to less than one percent in 2012. Driven by the desire to effect a positive change, government has initiated policies and programmes which have produced unsatisfactory results. International best practices identify interventions which can substantially contribute to effective and greater efficiency in financial credit system delivery. Such interventions, modified along the line of a developing economy environment are needed as integral part of efforts to initiate, develop and sustain MSMEs in Nigeria.

Keywords: supply-side financing; MSMEs; credit constrains; collateral; interventions.

1. INTRODUCTION

The working definitions of micro, small and medium enterprises (MSMEs) will be as provided by Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), which coordinates and facilitates the enabling environment in the country. A micro enterprise is one which employs a maximum of 10 persons with a turnover of not more than N10 million (circa US\$ 65,000) and an asset base excluding land and building, not exceeding N5 million (circa US\$ 32,000). A small enterprise employs between 10-49 persons with a turnover of between N10-100 million (circa 65,000-650,000) and an asset base (excluding land and building) of between N5-50 million

(circa US\$ 32,000-320,000), while the medium enterprise's turnover hovers in the region between N100-500 million (circa US\$ 650,000-3.2 million) with assets excluding land and building of between N50-199 million (circa US\$320,000-1.2 million) and having the capacity to employ 50-199 persons. In the MSMEs sector composition, the micro enterprises occupy the lion share of 98 percent and one percent each shared between the small and medium enterprises [1].

The benefits of MSMEs to the national economy are enormous hence the huge interest among practitioners, researchers, policy makers and advocates. Their relevance to the national economy includes the ease of start which has propped up an amazing population of 17.3 million enterprises in Nigeria employing about 32.5 million persons [2]. These figures may be conservative considering the large Nigerian underground economy. Evidence indicates increasing percentage points of underground economy to the official Nigerian GDP of 57.9; 58.6 and 59.4 percentage points in 2000, 2002 and 2003 respectively [3].

Other benefits of MSMEs include the assurance of a competitive business environment, mobilising local resources, creation of new industries, being a platform for industrialisation, poverty reduction, mitigation of rural-urban migration and the provision of intermediate goods for larger industry use. Indeed, MSMEs represent a nation's economic strength. Advantageously too, the Nigerian MSMEs are known to be distributed along sector lines within the regions therefore creating potential operating and cost synergies. Specifically, MSMEs accounted for 46 percent of Nigeria's GDP in 2010 [2].

However, as assuring as their relevance is, they are endemic hiccups which hinder their development. Frequently mentioned hiccups include weak infrastructures, difficulty in acquiring space, machinery and spares; corruption, low capacity utilisation and lack of capacity building [4]. But, the lack of access to financial credit remains top on the list of operational challenges affecting MSMEs [5,6]. Finance availability for industry use has been categorised by [7] into demand and supply sides. The demand side perspective explains expectation. The supply-side concept emphasises provision but its constraints in financial parlance explains misallocation outside the control of the firm. It portrays an imperfect condition which hinders access to funds in a well-defined environment. The supply-side explanation seems to typify the Nigerian situation hence our interest. Our major objective therefore is to expand the literature

in examining the major interventions in the management of the supply-side financing of MSMEs in Nigeria.

According to various publications including [8], the country boasts of a vibrant financial sector with 22 commercial, 5 development, 2 merchant, 871 micro finance and one non-interest banking institutions which post huge annual profits. Added to this list are 82 Primary Mortgage institutions, 62 finance companies and many other allied institutions. Interestingly, despite a sizeable bank loan portfolio, there is a negligible support to the MSME sector. Remarkably too, there has been a dwindling commercial banks loan portfolio to small scale enterprises as percentage of total credits from 27.04 percent in 1992 to less than one percent in 2012 [9]. For these two decades, the overall performance has not shown any appreciable improvement despite many interventions. Table 1 shows the ratio of commercial banks' loan to MSMEs as a percentage of total loans for the said period.

Table 1. Ratio of Commercial Banks' Loan to MSMEs, 1992-2012

Period	Commercial Banks Loans to small scale Enterprises (₦ million)	Commercial Banks Total Credit to private sector (₦ million)	Commercial Banks Loans to Small Scale Enterprises as percent of Total Credit (%)
1992	20,400.0	75,456.3	27.04
1993	15,462.9	88,821.0	17.41
1994	20,552.5	143,516.8	14.32
1995	32,374.5	204,090.6	15.86
1996	42,302.1	254,853.1	16.60
1997	40,844.3	311,358.4	13.12
1998	42,260.7	366,544.1	11.53
1999	46,824.0	449,054.3	10.43
2000	44,542.3	587,999.9	7.58
2001	52,428.4	844,486.2	6.21
2002	82,368.4	948,464.1	8.68
2003	90,176.5	1,203,199.0	7.49
2004	54,981.2	1,519,242.7	3.62
2005	50,672.6	1,991,146.4	2.54
2006	25,713.7	2,609,289.4	0.99
2007	41,100.4	4,820,695.7	0.85
2008	13,512.2	7,799,400.1	0.17
2009	16,366.5	9,667,876.7	0.17
2010	12,550.3	9,198,173.1	0.14
2011	153,284.6	38095845.6	0.40
2012 Q1	14,875.1	9,520,552.0	0.16
Q2	15,065.4	10,048,406.5	0.15
Q3	14,995.8	10,274,095.4	0.15
Q4	13,863.5	10,440,956.3	0.13

*Source: CBN statistical bulletin 2013

This Nigerian MSMEs situation is further compounded by the fact that the vital role of government in providing an enabling environment (finance, infrastructure, knowledge and policy) is low when compared to fellow African countries like South Africa and Egypt. The total loans as percentage of GDP for example are equally not impressive. The 2006 figure was 19.7 percent compared to Egypt's 53.3 percent and 94 percent of South Africa [10].

Apparently, financial credit constraint is a global phenomenon. This has resulted in credit rationing [11], a situation where borrowers are denied access to financial credit even where such borrowers are ready to pay higher interest rates. Government constraints, imperfect market conditions, difficulty in identifying the good borrower and rising risk with interest rates are some of the identifiable reasons for credit rationing. Certainly, these are common features in all economies. Other reasons alluded include collateral issues, in-explainable exogenous shocks; behavior, distribution and size of borrowers. [12] Have indicated that, the small size firms are the most vulnerably in issues of financial constraints. Larger firms seem to fare better.

It is worth mentioning that certain characteristics, apart from size separate the small from the large businesses in credit rationing. The differences include management and ownership unification in both economic and emotional levels, lack of professional attention to issues, short life expectancy and the fact that private equity affects the risk positioning of the owners [13]. These differences consequently impact on the finance functions and the overall organizational performance.

2. POOR FUNDING EFFECTS ON MSMEs

The business process from conception, the coming forth, growth, maturity and even failure revolve around finance [14]. Researchers have shown that capital requirement and the availability of finance resources affect entrepreneurial propensity [15,16]. Access to this important resource according to [17] is the absence of price and non-price barrier in the use of its services. This does not mean financial availability to all and sundry but that such is based on credit worthiness of the applicant. While finance comes in various forms, types and structures, the two main easily available for most businesses are debts and equity. Whether externally or internally generated, finance goes a long way in the process of accomplishing business objectives [18].

Studies including [19,20,21] have identified constrained financial credit as negatively affecting new firm entry into the market and the consequent decreased post-entry growth. Relaxing the constraints on the other hand is believed to positively affect small firms more than they do to larger ones. In their own opinion, [11,22] posit that collateral provision which is the asset pledged to borrow until payback time; long term exclusive relationships and repeat borrowing which are non-common features of MSMEs are some of the fundamentals that tilt the proportion of finance credit in favor of the larger firms. [23,24] have successfully associated lack of finance to firm's growth and innovation impediment, even as [25] have identified its adverse contribution towards firm survival. Equally, lack of funds limit the firm's capacity to replace low quality employees [26,27] have emphasized low firm performance as fall-out of external funds dislocation.

Internally generated funds from profits of MSMEs take long time to accumulate and they have dire consequences on long term plans if they serve as the only source of financing. The inability to capitalize on business opportunities due to paucity of funds has the capacity to hinder competition and thwart growth tendencies. This is because businesses require working capital and long term funds to operationalise activities. Modernisation process will be slow, transition to larger enterprises will be affected and inter-firm and industry linkages will be frustrated. Certainly, the overall effects of MSMEs on national economy will be negatively impacted.

3. BUT, WHAT WERE THE INTERVENTIONS?

Government has played a proactive role in broad areas of regulatory and supervisory frameworks. This role involves licensing requirements, identification and classification of institutions for the promotion of competition, financial infrastructure for the introduction and development of credit reforms and bureaux, registries and business registration procedures. Others are equity investment, direct public intervention like credit guarantee schemes, apex and wholesale funding facilities as well as value-chain organization projects. There is also the informal sector whose role includes money lending between friends, money lenders, family foundations and credit associations. It is however difficult to get information from the informal sector

due to weak credit skills and practice. However, some specific public interventions include:

- I. National policy on MSMEs which was launched in 2007 by SMEDAN to facilitate the promotion and development of efficient supportive environment. The policy identifies seven key areas of institutional; legal and regulatory framework; human capital development; research and development; extension and support services; marketing; infrastructure and finance. Each identified framework has plans for actualising specific objectives within a time frame. The policy streamlined definitions of MSMEs from a plethora of definitions that bedevil the sector.
- II. Micro-finance policy. The existence of a huge market not serviced by financial institutions; poor banking culture and low level of financial literacy; and the need to empower the poor were some of the justifications for this policy which was launched in 2005 and modified in 2011 [28]. The policy objectives include:
 - a. A 10 percent annual increase of access to financial services of the economically poor.
 - b. Increase of micro credit share as percentage of GDP from 0.2 percent in 2005 to at least 5 percent in 2020.
 - c. Participation of all federating States and FCT as well as two thirds (516) of all Local Government Areas in micro finance activities by 2015.

Nigeria has 871 single-branched microfinance banks (MFBs) which are not evenly distributed across the country with most of them privately owned. Of the number, 82 MFBs service the North-West and North-East geo-political zones which has the highest unbanked rate when compared to the over 500 in the South-West and South-East geo-political zones. The entire MFB network according to [29] serves 3.8 percent of the adult population (3.2 million clients) of which only 14 percent use credit products.
- III. Small and Medium Enterprises Equity Investment Scheme (SMEEIS) was an initiative of the Bankers Committee [30] which required all banks to set aside 10 percent of Profit After Tax for investment and promotion of small and medium enterprises (SME). For the purpose of the scheme, an SME was defined as one with a maximum asset base of N1.5 billion with no lower or

upper staff limit. Trading and financial activities were not covered by the scheme. With a single digit interest rate, benefiting enterprises were to surrender part of their ownership structure to the financing bank with a provision of financial and technical services from the bank. Seven years after its inauguration, the scheme was discontinued in 2008.

- IV. Bank of Industry (BOI) is the largest project and industrial financing establishment in Nigeria. It commenced operations from the reconstruction of Nigeria's foremost development bank, Nigerian Industrial and Development Bank. It has the mandate to provide assistance to the establishment of large, small and medium enterprises as well as rehabilitation of ailing industries. As a development fund administrator, it receives funds from official entities, developing agencies and State governments. These include N5 billion Dangote's small business development fund, UNDP's USD 4 million access to renewal energy project, N3 billion micro enterprise fund for 9 States; CBN's N500 billion intervention fund; N100 billion cotton, textile and garment industries revival scheme, N10 billion Rice Processing Fund and State government dedicated funds for the benefit of indigenous entrepreneurs in respective States. In fulfillment of its paradigm shift of committing 85 percent of its resources in support of SMEs while 15 percent goes to large enterprises, statistics shows disbursed funds to SMEs increased by 35 percent, 85 percent and 96 percent in 2001, 2006 and 2010 respectively in proportion of 65 percent 15 percent and 4 percent to large enterprises in the same period [31].
- V. National Economic Reconstruction Fund (NERFUND) was set up in 1989 to provide needed medium to long term credit facility to viable SMEs, especially those of the manufacturing, mining and agro-allied sectors. Loan facility is in two categories; the less than N5 million micro loans and the over N5 million SME loan. The agency's treasury was boosted in 2010 with a stimulation package of N200 billion. Information from the agency's website [32] showed that between March, 2010 and May 2013, of the 8215 loan applications valued at N25.7 billion, only 1497 projects valued at N5 billion were approved.
- VI. Commercial Agricultural Credit Scheme (CACCS). The objectives include:
 - a. To develop the agricultural sector by providing credit facilities to agro-allied entrepreneurs at a single digit interest rate.

- b. To enhance national food security.
- c. To reduce cost of credit in agricultural production.
- d. To produce input for industrial sector on a sustainable basis.

4. INTERVENTION OUTCOMES AND CONSTRAINTS

Despite the afore-mentioned interventions and many other public sector initiatives, the overall penetration level is exceedingly low. According to [33], 73 percent of Nigerians expressed concerns about getting a loan [31] identified some fundamental flaws in past and existing intervention programmes in the supply-side management. Finance lending institutions were known not to be favourably disposed to advancing financial resources to micro enterprises despite apparent clarity in the definitions of MSMEs. The definitions are often used loosely enthrone different eligibility criteria for enterprises applying for financing. Larger enterprises and the high yielding government debts are preferred for their high returns and as risk avoiding mechanism than lending to MSMEs. Supporting the above claim is the high cost of lending to MSMEs since the administrative costs are relatively constant to the small loans. Additionally, Nigeria has a weak capital market and a few development banks. Most other banks rely on short term liabilities for lending to avoid mismatch in maturities of assets and liabilities. The global financial crises with corresponding international finance architectural redesigning caused lesser linkages in the flow of long term funds.

Negatively too, Nigeria has a weak data base resulting from the poor data collection, storage, analysis and retrieval [34]. The country lacks a reliable identification system, has no developed collateral administration system and operates a nascent credit documentation databank. It is worth adding that some of the operating enterprises are not officially registered and many also without audited and recorded financial history. These challenges inhibit the potential for lending based on financial records. Equally identified as worrisome was the mentality of micro finance institutions behaving as 'mini' commercial banks awaiting full commercial banking operating license. This mentality has therefore disenfranchised many in the target group. But, the biggest challenges of MFBs are high refinancing costs compounded by low focus on deposits, high operating expenses and low staff capacity, leading to

poor asset portfolio. Certainly, the vast majority of MFBs lack the scale and operating capacity to have a strong impact on the target group.

The venture capital and private equity industry is novel and almost not in existence, perhaps the foundation for SMEEIS' failure. SMEEIS failed to meet its objectives hence its discontinuance [30]. Enterprises were not willing to accept banks as equity partners as the latter were seen as not having the skills in equity investment. Besides, the programme was against the prevailing culture of absolute ownership of business by their owners [35]. This resulted in the clash of confidence as social perceptions and administrative attitudes did not align. In all cases of banks providing credit, stringent collateral conditions were paramount. The lack of collateral would therefore naturally compound lending possibilities as it remained a major drawback preventing banks from lending. In [36], 80 percent of banks were known to have difficulties in this regard. Moreover, the operative environment of weak property rights and poor contract enforcement processes remain unattended to and legal issues take long time to incomplete resolve at the courts of law.

Consequently, [37] as represented in Fig. 1 identified specific constraints and the levels of effect on the overall finance supply side environment. Collateral conditions occupied an enviable 42 percent. Collateral is an asset pledged to borrow, redeemable when repayments are completed. It gives banks a fall-back position in times of loan default. Most MSMEs couldnot afford it and banks were hindered from financing their projects. Loan Applications occupied 13 percent, poor credit history 10 percent, insufficient profitability 6 percent and other objections, 29 percent. From the above, the constraints can broadly be categorised as collateral-based; financial illiteracy, information gap and insufficient profitability.

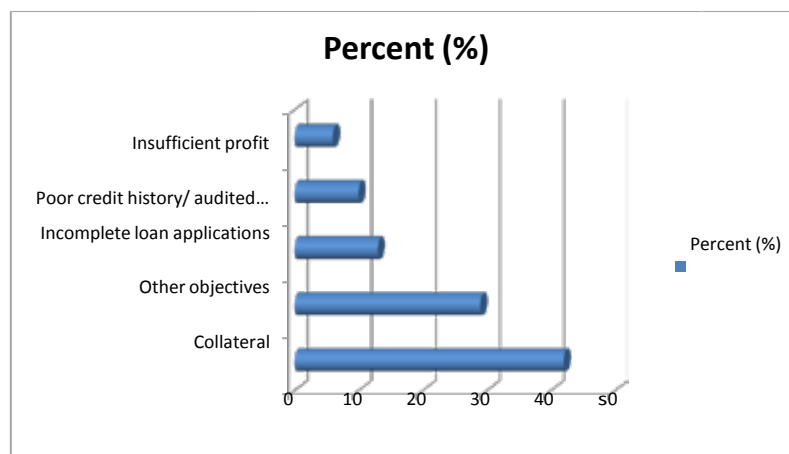


Fig. 1. Supply-side loan constraints

**Source: World Bank (2012b)*

5. THE WAY OUT

The malaise of finance to MSMEs is not peculiar to developing economies. The need for recalibration of strategies for better outcome can better be captured in the words of the European Commission Vice President Antonio Tajani, who is Commissioner for Entrepreneurship [38]. While acknowledging the finance capital insufficiency and industry for European SMEs, definite plans capable of shrinking the finance gulf for remarkable and measurable results were suggested.

Access to finance of SMEs remains difficult and is one of the main reasons for the current economic downturn. Therefore we intend to enlarge our loan guarantees to SMEs under the new COSME programme as of 2014. Each euro dedicated to our guarantees has the power to stimulate - on average - 30 Euros in bank loans. This is crucial to help Europe's jobs engine, our small enterprises, to run smoothly again. It is they who create 85 percent of all new jobs.

Bridging the 'financing gap' is so important to national economies considering the vital role of MSMEs. It is even more important for the developing economies with a very high poverty profile without social safety nets with the attendant consequences. Such 'redemption plans must appraise existing programmes and policies to identify loose links for necessary attention in line with the weak structures. Information dissemination plays a vital role and activities of financing institutions must be highlighted. Studies have shown exceeding Nigerian banks interest in the less risky government bonds at the expense of loaning to the MSMEs. Indicators of domestic credit to the private sector as a percentage of GDP have not shown tremendous improvement. There was a yearly average of about 13.4 percent between 2000 and 2006, which grew to 25.33 percent in 2007; 33.91 percent in 2008 and reached its peak of 38.59 percent in 2009 but dropped precipitously to 20.9 percent by January 2011 [39]. Based on the above, we have made the following recommendations:

1. There should be legalised and enforceable definitions of MSMEs as these will help in better planning and standardisation of funding criteria and programmes.
2. The informal and private sectors-driven lending institutions should be encouraged and integrated into the mainstream MSMEs funding programmes.
3. MSMEs unit should be established in banks with staffs adequately and specifically trained in the core-functional area.
4. There should be more information on financial opportunities to MSMEs.

5. Incentives should be given to commercial banks as motivation for lending to the MSMEs sector.

6. Banks should allocate certain percentage of their domestic credits to MSMEs. A policy encouraging banks to apportion a specified yearly allocation to MSMEs as loans should be envisaged.

7. There should be a review of collateral requirements in favour of credit scoring [40] where the information from tax authorities could be relied upon. Credit scoring is a statistical method used in analyzing historical data on borrowers to predict possible loan default in future.

8. An accounting standard specific to MSMEs should be developed in line with International Finance Reporting Standards. The conventional accounting methods appear to be specified to the large corporate organizations.

9. The development of a functional and reliable data base for easy information retrieval is of great essence.

10. Efforts should be made towards simplifying loan procedures and documentations.

11. The use of Mutual Guarantee Institution, a form of group lending in which banks lend to a group rather than a individual should be encouraged. Such lending promises a joint responsibility of honouring the liability. This will mitigate informational asymmetries as the members can easily screen, monitor and relate with each other than as would be done by the lending institutions.

12. Disputes resolution process should reflect the peculiar needs of the sector. This is because conventional courts take longer time to resolve issues; this does not auger well for a firm's health.

6. SUMMARY AND CONCLUSION

We have placed on record the ubiquitous nature of constrained finance credit as a global concern [11,20] and paid particular attention to its supply-side management within the Nigerian MSMEs sub sector [37,31,10,2]. Though a universal problem, the Nigerian situation is unacceptable given the available resources, opportunities and inherent potentials. The various policies and programmes having not yielded the expected beneficial results suggest a wide gap between their formulation and implementation. Government, organisations and agencies must take responsibility. Fundamental issues like collateral and loan application challenges are

areas that banks can deal with. Banks have a role to play. They should re-strategise, enlarge the markets and simplify rules of engagement. But, these must be done in collaboration with others since some of the associated issues are outside the banks' control. They include weak public structures [31], poor data management [34] and issues relating to culture [35]. These known fundamentals play a big role in bringing out the negative symptoms. Addressing the abysmal performance along the line of peculiar environmental issues raised would certainly promise a future. Our suggestions which are specific can positively alter and deepen the loan penetration within the studied sub-sector. The result will be a better national economy. Certainly, it is worth mentioning that, the vividly noticeable exponential fall in credit provision to MSMEs in Nigeria suggests a robust research thrust to interested scientists.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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***Performance and Visitor's Satisfaction
of Recreation Facilities in Akure Metropolis:
a Veritable Tool for Impacts Studies
in Undp Mdgs Cities in Nigeria***

ABSTRACT

Performance of recreational centers and level of satisfaction derived by participants are considered as veritable tool to explore the economic and social impacts of recreational activities on the host communities in UNDP MDGs cities. This research work was undertaken in four of the randomly selected recreation centers in Akure Metropolis through multiple research techniques including site observation, personal communication, questionnaire administration and collection of secondary data. The research was undertaken during the weekends over a period of six months between January and June 2013. It was observed that greater percentage of the participants (80%, 90%, 100% and 71.4%) expressed their willingness to revisit; this is an indication that the satisfaction and purpose of their visits have been achieved. Over 50% of the respondents in all the centres also indicated that the quality of services being provided was good. None of the staff working in any of the centers received less than \$1 daily this form part of the target of UNDP MDG to eradicate poverty and hunger by year 2015. While facilities being enjoyed most by the visitors need to be maintained others need to be improved upon and additional ones need to be acquired to boost customer's patronage. Private and government operators of recreation centers as well as other policy makers in tourism industry will

benefit tremendously from this research output in their quest to meet the economic and social needs of their communities.

Keywords: recreation centers; UNDP MDGs cities; host communities; social and economic impacts; tourism industry.

1. INTRODUCTION

If the proverb All works and no play makes Jack a dull boy (Randle, 1611) is anything to go by then it is highly expedient for men to take enough time to relax, refresh and recreate most especially during their leisure hours. Recreation and leisure are very synonymous with multiple meaning depending on the author. Leisure is defined as free or unobligated time that does not involve work or performing other life sustaining functions [1]. Recreation from an individual perspective involves as example watching Television, attending an Opera, base jumping, moving the lawn, taking your children to zoo, playing snookers/checkers, downloading music, writing book, an evening in the town [2].

Leisure and recreation have become important concerns in modern day societies and they became recognized as cause for concern during the Great Depression of 1930s [3]. Both anxiety and extensive stress are as a result of overwork and they have been identified as indications of depression. Depression disrupts relationship and interferes with work and daily activities and must therefore be afforded. [4] recalled that the result of increased leisure that is not properly utilised can manifest in various societal problems ranging from idleness, depression, violence, alcoholism, drug abuse and other related vices. Study revealed that more than 6 million in the U.S have depression each year with an estimated 19 million adults living with major depression [5]. This is contrary to happening in Nigeria, considered that there were lots of other avenues or facilities for releasing tension in time of stress, anxiety or overwork during leisure to become well adjusted [6]. With seven established National Park, game reserves, two UNESCO world heritage sites (the third being enlisted is in Idanre few kilometres away from Akure, Ondo-State capital), opportunities to visits and participate in traditional and cultural festivals, moonlight stories, fishing and playing various types of games, Nigeria is a rich tourists and recreational destination.

Tourism and recreation are synonymous and they are used interchangeably in this context. Both tourism and outdoor recreation activity involve travel and interaction

with other people, and with environment in its widest meaning [3]. Apart from improving the state of health, the social, economic, ecological and spiritual importance of involving in recreational and tourism activities cannot be overemphasized. While tourists visit to in-situ conservation areas like park, lake, game reserves, waterfalls, hills, amusement parks, mountain tops can be regarded as outdoor recreation, visit to museum, playing snookers, watching television are categorised as in-door recreation. If recreational centers can provide accommodation for the people that come to visit then visitors can decide to spend more than twenty four (24) hours and thereby regarded as tourists. [?] recalled that visit to outdoor recreational centres has drawn hundreds of thousand people in Australia, Canada, New Zealand, United Kingdom, United States and other industrialized nations and this has recorded rapid growth since World war II. Incidentally, with exception of New Zealand all other countries as mentioned were listed among the World's top fifteen tourism earners [8].

Tourism has grown rapidly to become a major social and economic force in the world. Tourism is a major contributor to the World's economy, accounting for greater than nine percent of global GDP and almost nine percent of jobs globally, thereby making it one of the largest categories of international trade [9]. Tourism is an industry where there is a growing positive balance of trade flowing from developed countries to developing countries [10]. Recreation industry, is relatively labour intensive, hence, tends to generate a larger and more rapid increase in employment than equal investment in other economic activities [11]. In Nigeria the Industry is one of the growing sectors of the country's economy (Nigerian Tourism Development Master Plan) [12].

Different categories of people visit recreation centers to experience one thing or the other. Changes in socio demographic characteristics, technological advances and disposable income of the visitors to recreational centres have imposed several dimensions to the way the leisure is spent, and on the extent and nature of recreational participants. [13,14] claimed that whether a tourists is satisfied or not towards a destination is related to tourists characteristics such as socioeconomic and demographic factors, motivations and future intention to travel to another similar destination. Tourists characteristics also have significant relationships with satisfaction. Differences in characters can contribute to the differences in expectation and satisfaction towards tourism destination. [15] Mentioned that different types of tourists tend to undertake different patterns of activities, which will have different types and

levels of impact on a destination. Since there is no particular or clear method of measuring the value of recreation experience except by circumstantial evidence. If visitors don't complain, if they speak enthusiastically and if they come back, one assumes that they find the experience worthwhile. Recreation is a discretionary. If it doesn't seem worthwhile, the individual can choose to avoid the experience or to participate somewhere or somehow else [16].

In recent years researches have been carried out pertaining to recreation, these researches include visitor perceptions, planning for outdoor recreation and tourism, recreation environment relationships and impacts of outdoor recreation [17], the benefits of outdoor recreation [18] and outdoor recreation demand [19]. However there is dearth of information on recreational facilities and services offer, visitor's preference and perception and social economic impacts especially in Nigeria Metropolitan. This research work therefore is hinged on providing this information.

Akure Metropolis is not only the capital of Ondo-State, Nigeria but is one of the selected UNDP MDGs (Millennium Development Goal) Cities in the World this is in addition to the presence of two Millennium villages namely Ikaram and Ibaram in the state [20]. The reason for selecting Akure as a millennium city cannot be far-fetched consider the immense potentials of the State in term of natural endowed resources such as petroleum (one of the oil producing state in Nigeria); uncultivated forest area and favorable topical climate; large deposit of bitumen; and vast expanse of coastland suitable for fishing, recreation and transportation, proposed UNESCO World Heritage site (Idanre Cultural heritage site less than 10 km from Akure). The State has equally witnessed transformation in the last few years with creation and establishment of government and privately owned recreation centers and other social amenities such as Mega Primary school, Mother and Child hospitals, town beautification (planting of trees/shrubs along the roads, construction of fountain), Neighborhood modern markets and Neighborhood recreation centers. This assertion gives credence to the state as the fastest growing tourist destination in Nigeria. Development of these recreational facilities and social amenities and improvement in services offered to the visitors will go a long way in increase patronage which will eventually transform to employment creation, income generation, improve social economic wellbeing for the host community. It is in the light of this phenomenon that this research is undertaken to explore the recreational facilities and services in the state and assessed visitor's preference and perception as a developmental road

map towards realizing UNDP MDGs number one objective of eradicating poverty and hunger in MDGs cities by year 2015 [21]. Research output will provide information on the state of available recreational centers and social amenities in Akure Metropolis; demographic characteristics of the visitors; work force being engaged; preference and perceptions of the participants. This will be of tremendous benefits to the visitors, government and private owners of entertainment and recreation centers and other tourist providers in the development of Park and Recreational Plan (P and RP) for the Millennium city of Akure.

2. MATERIALS AND METHODS

2.1 Study Area

Ondo State, Nigeria was created on 3 February 1976 from the former Western State. It originally included what is now Ekiti State, which was split off in 1996. The majority of the state's citizens live in urban centers. Ondo State contains the largest number of public schools in Nigeria — over 880 primary schools and 190 secondary schools. Akure is located approximately 700 kilometers South West of Abuja, the Federal Capital of Nigeria and about 350 kilometers to Lagos the former capital of Nigeria. Akure is the state capital of Ondo State and it is surrounded by communities such as Iju-ltaogbolu, Owo, Ondo, Igbara-Oke, Idanre etc (Fig. 1). It is located within the tropical rain forest region of Nigeria where rainfall is high throughout the year. The 1991 national population census [22] put the population of Akure at 239,124 and its estimated population in 1996 will be 269,207.

2.2 Methods

Various research techniques were implemented in collecting data for this study to include Site observation, personal communications, survey questionnaire and collection of secondary data [23,24,25]. Multi-method techniques are often deemed necessary [26], especially when the research is exploratory [23].

2.3 Site Observation

This technique involves visiting the recreational centers in the study area to assess and make systematic observations of the phenomenon. It was used to obtain information that would not be available from other sources of information. The authors collected information at each site by positioning themselves at strategic points in the

recreation sites for a period and walking around the sites in any of the visiting period of two days per week (mostly at the weekend, Friday and Saturday).

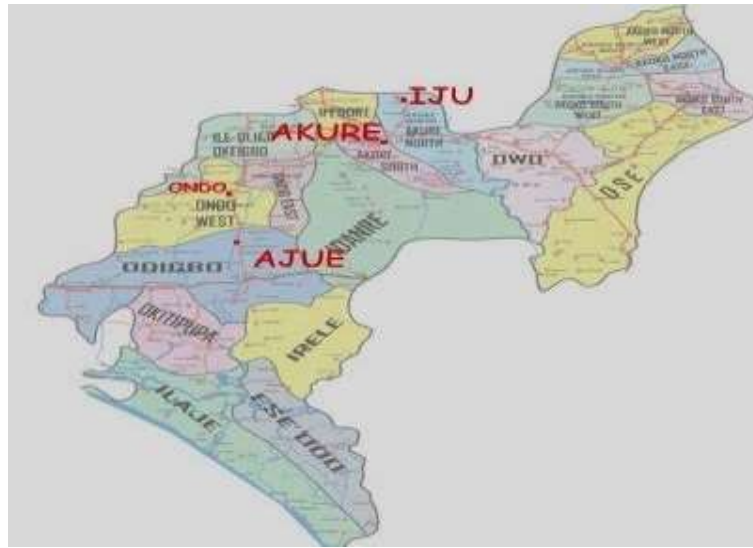


Fig. 1. Map of Ondo-State Showing Akure the State capital and other neighbouring towns

Source: Ondo State Ministry of Land and Housing, Akure, Ondo-State

2.4 Personal Communications

Personal communications were held with the visitors that were encountered at the sites. This was done basically in order to interact with the participants with a view to obtain first-hand information from them.

2.5 Survey Questionnaire

The questionnaire for the survey portion of the study was developed in English, English being the official language in Nigeria. Although the questionnaires were designed for self-administration however the researches were available to guide the respondents who are unable to complete the questionnaire on their own in order to obtain full return and quality data. The questionnaire was divided into two sections. The first section captured the socio-demographic information of the respondents. The second section contains the non-demographic information.

2.6 Secondary Data

Secondary data were obtained in term of the management of the site either it is government owned or individual, time of operation or visiting hours, staff strength and record of visits.

2.7 Sampling Technique: Assuming

A represents = Ministry of Agriculture Botanical Garden

B represents = Oyemekun Rocks Unity Village

C represents = Neighbourhood Recreation Park

D represents = Prof. Afolayan Wildlife Park

The total numbers of questionnaires administered in different recreation center were determined by taking 10% of the total number of visitors visiting in a week for recreation center A, B, and C while in recreation center D, 10% of the number of visitors that visit the recreation center in a month was taken as the sample size (Table 1). This decision to take 10% of the number of visitors in a month was as a result of low and inconsistency in the number of visitors visiting the Wildlife Park in a week.

Table 1. Number of administered questionnaire

Name of Recreation Center	Sample size	Questionnaires administered
A	10% of 200 (visitors in a week)	20
B	10% of 200 (visitors in a week)	20
C	10% of 500 (visitors in a week)	50
D	10% of 300 (visitors in a month)	30

The questionnaires were administered on weekends base on Knudson's (1984) judgment that recreational activities are mostly done on weekends.

3. RESULTS

3.1 Assessment of the Recreation Facilities and Services

This result was obtained from site observation and secondary data collected.

3.1.1 Ministry of agriculture botanical garden

Ondo State Ministry of Agriculture Botanical Garden is owned and managed by the State Ministry of Agriculture. The garden has a collection of tree species interspaced with other shrubs. Sited very close to the sitting arena was a nursery where young trees are raised for future propagation. The garden provides recreation and relaxation facilities and services for its visitors and also offers food and drinks (Table 2).

The recreation center discharges these aforementioned services to the visitors through a total number of 10 staff and the center receives between 200 to 300 visitors in a week with the highest number of visitor coming during weekend. The staff consists

of workers in the junior and senior cadre with average salary of ₦20,000 (\$118) per month. Entry to the botanical garden is free but visitors will need to pay for foods and drinks purchased.

Table 2. Major facilities and services in the botanical garden

Facilities	Services
Swings	Waiter and busboy services
Bars	Barbecue services
Restaurant	DSTV services
Suya spot	
DSTV facilities	
Parking Space	
Sound systems	

3.1.2 Neighborhood Recreational Park (NRP)

This recreation center is one of the transformations the town has experienced in the recent time. The center is equipped with modern recreational facilities that serve the aspiration and satisfaction of the participants (Table 3).

Table 3. Major facilities and services being provided at NRP

Facilities	Services
2 snooker boards	Waiter and busboy services
1 standard table tennis board	Barbecue services
A basketball court with its equipment	DSTV services
A D.J (Disk Jockey) house and stage	Disk Jockey services
Suya and Asun spot	Cooks
8 small bars comprising 4 chairs each and a small middle table	
Small and big halls for relaxation	
Restaurant	
DSTV facilities	
Projector for projecting live football matches	
Parking space	

The recreation center receives 500 visitors in a week and has 15 staff excluding the manager of the center. The salary of the workers vary between ₦10,00 to ₦40,000 (\$59-\$236) per month. Entry to the recreation center is free but visitors pay for other services like playing of games, drinks and foods (Table 4).

Table 4. The park charges for the use of recreation facilities

Recreation facilities	Amount charged for use
Table Tennis	₦50 for a complete round
Snookers	₦100(<\$1) for a game
Basketball	Formally ₦100 per person participating in a match but now free due to complaints from players.

3.1.3 Oyemekun rocks

This is a privately owned recreational center in Akure metropolis, it is a natural outcrop (rocky formation) and it is regarded as one of the wonders of nature with inscription of geographical map of the world, human and animals. The rock has caves (grottos) with sitting arrangement for relaxation (Table 5).

Table 5. Recreational facilities and services offered at Oyemekun rock

Facilities	Services
Swings	Waiter and busboy services
Indoor games: Scrabble, Chess and WHOT Card	Barbecue services
Bars	DSTV services
Executive canopy for party	
Resting room DSTV facilities	
Asun/Pepper soup spot	
Fish pond	
Parking space	

Oyemekun rock receives over 200 visitors in a week and has a total number of 6 staffs excluding the manager of the place. Average salary of the workers excluding that of the Manager was put at N10,000 (\$59) per month. While entry to the recreation center for relaxation is free, visitors paid for other services rendered. In addition to these, excursionists and tourists that came to experience nature and viewing were charge extra fees (Table 6). The recreation center also serves as night club for night fun seekers.

Table 6. Facilities, services and charges in Oyemekun rocks

Facilities	Amount charge
Swings	N20, N30, N50 depending on the swing
Excursionist	Student: N100, Adult: N500
Executive canopy with sound system	N20,000
Executive canopy without sound system	N10,000

3.1.4 Prof. Afolayan Wildlife Park

Prof. A. Afolayan Wildlife Park serves both in-situ and ex-situ conservation purposes. While some parts of the Park are designed as zoological garden (ex-situ) the other parts serve as undisturbed semi-wild area or sanctuary (in-situ). Species of animals on display in the zoo and the facilities provided are as listed (Table 7).

The park receives over 300 visitors in a month and over 2000 visitors in a year. Visitors to the park are charged before entering the park, student and young children pay N100 (<1\$) while adults pay N200 (>\$1). After the payment, visitors can

use all the facilities provided without having to pay any extra charges but the visitors need to pay for drinks and food. The park has (3) three staffs on shift (morning, afternoon and evening), two gardeners and two night guard.

Table 7. List of animals and recreational facilities in the Wildlife Park

Animals (with scientific names)	Facilities and Services
Crocodile (<i>Crocodylus niloticus</i>)	Swings
Giant grass cutter (<i>Thryonomys swinderianus</i>)	Indoor games Red
Red Flanked duikers (<i>Cephalophus rufilatus</i>)	Picnic sites Gazelle
Gardle (<i>Gazella dorcas</i>)	Pens of Animals
Duck (<i>Anas spp</i>)	Parking space
Goose (<i>Anser anser domesticus</i>)	Museum of Natural History Crown
Crown crane (<i>Grus balearica</i>)	Tour guiding/ Park Interpretation
Ostrich (<i>Struthio camelus</i>)	
Red capped Mangabey (<i>Cercocebus torquatus</i>)	
Baboon (<i>Papio Anubis</i>)	
Tantalus monkey (<i>Cercopithecusethiops</i>)	
Patas monkey (<i>Erythrocebus patas</i>)	

3.2 Comparison of Visitors' Profile

3.2.1 Age composition of visitors

Findings from this study revealed greater percentage of visitors to recreation centres in Akure metropolis are within the age range of 20–30 years. None of the recreation centres, excluding Ministry of Agriculture Botanical Garden receives visitors over 50 years of age and above. The percentage of visitors with age range of 20–30 and between 30–40 years are the same (35%) for Ministry of Agriculture Botanical Garden. Young children between the ages of 10–20 were recorded low (5%, 8% and 5%) in all the recreation centres except in Prof. Afolayan Wildlife Park where the percentage of visitors between 10–20 years was significantly high (23%) (Fig. 2).

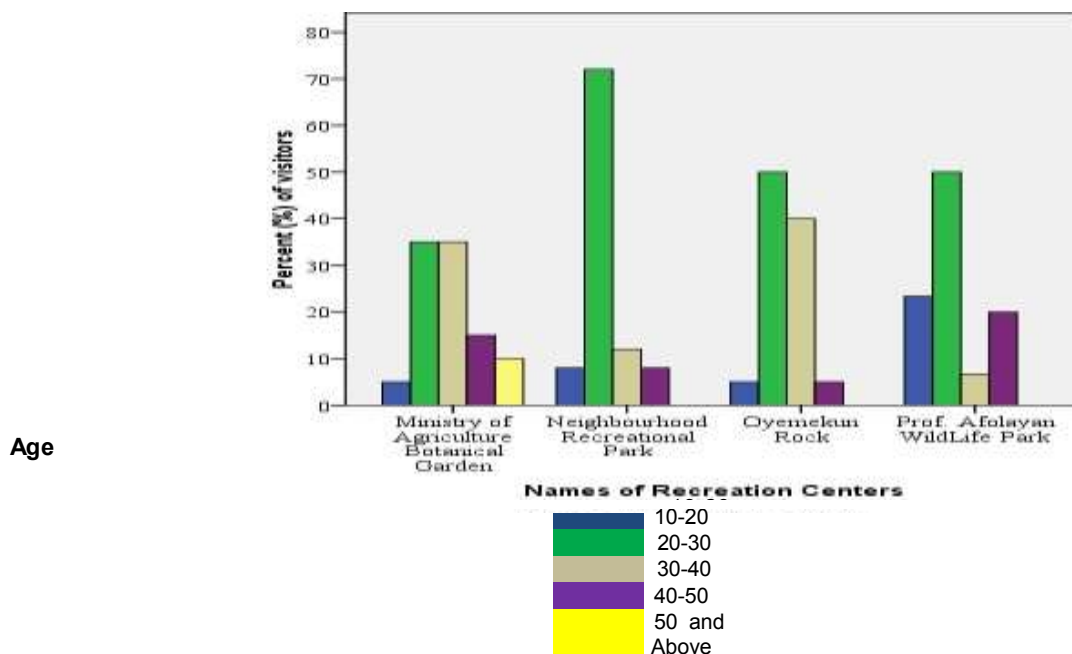


Fig. 2. Age of the visitors

3.2.2 Gender classification of visitors

Male visitors to the recreation centers in Akure metropolis are higher (85%, 88%, 95%) than their female counterparts and the difference between the percentages of male to female is very significant in the entire recreation center except in Prof Afolayan Wildlife Park where the ratio of male (53.3%) to female (46.7%) is not significant. Oyemekun rock receives the highest percentage of male visitors (95%) and lowest percentage of female visitors (5%).

3.2.3 Classification by marital status

Greater percentage of visitors to Oyemekun rock (70%), Wildlife Park (66.7%) and Neighbourhood Recreation Park (80%) were single while most (55%) of the visitors to the Botanical Garden were married. Category of people that are divorcee, widow, widowers fall into others (10%).

3.2.4 Occupations of visitors

Private work owners recorded the highest percentage of patronage to both the Ministry of Agriculture Botanical Garden and Oyemekun rocks as they represented 45% and 55% respectively. This is unlike the result obtained in Neighbourhood recreational Park and Prof. Afolayan Wildlife Park where students represented 44% and 46.7% respectively. The lowest percentage of civil servants patronage was obtained in Oyemekun rock with 5% (Fig. 3).

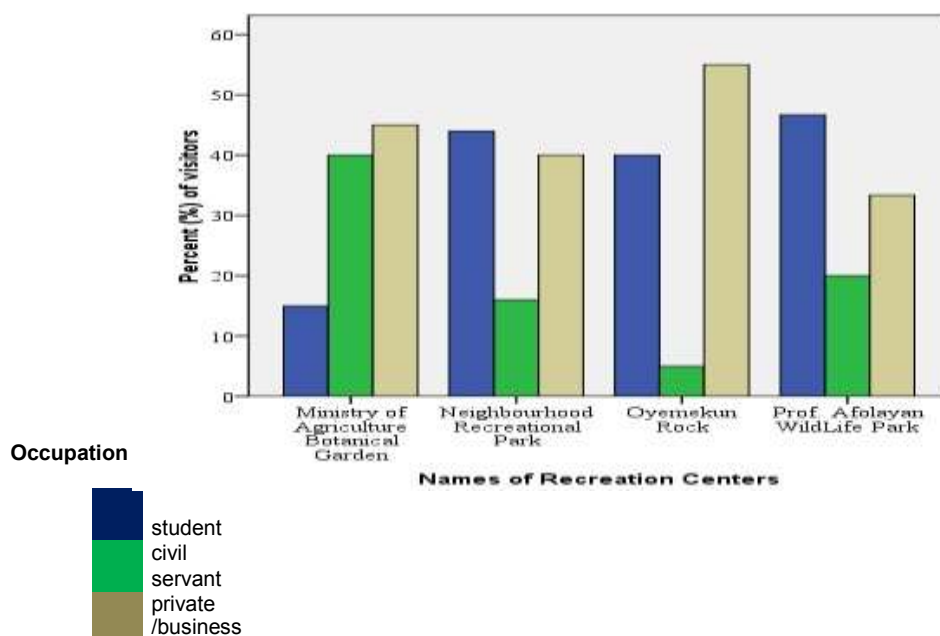


Fig. 3. Level of occupation of the respondents

3.2.5 Visitors' level of education

Greater percentage of the visitors to all the recreation centers possessed tertiary education qualification with the Ministry of Agriculture Botanical Garden recorded the highest percentage (95%) of visitors in term of tertiary level of education. Prof. Afolayan Wildlife Park receives a higher number of visitors from primary school (16.7%) compared to other centres.

3.2.6 Visitors' monthly income

Greater percentage (41.2%) of the visitors to Ministry of Agriculture botanical garden earned ₦100,000 and above monthly compared to the visitors to botanical garden. Highest proportion (39%) of the visitors to Neighborhood Recreational Park earned between ₦5000 — ₦20000 monthly. Majority (77.8%) of visitors to Prof. Afolayan Wildlife Park earned between ₦5000 — ₦20000 (Fig. 4).

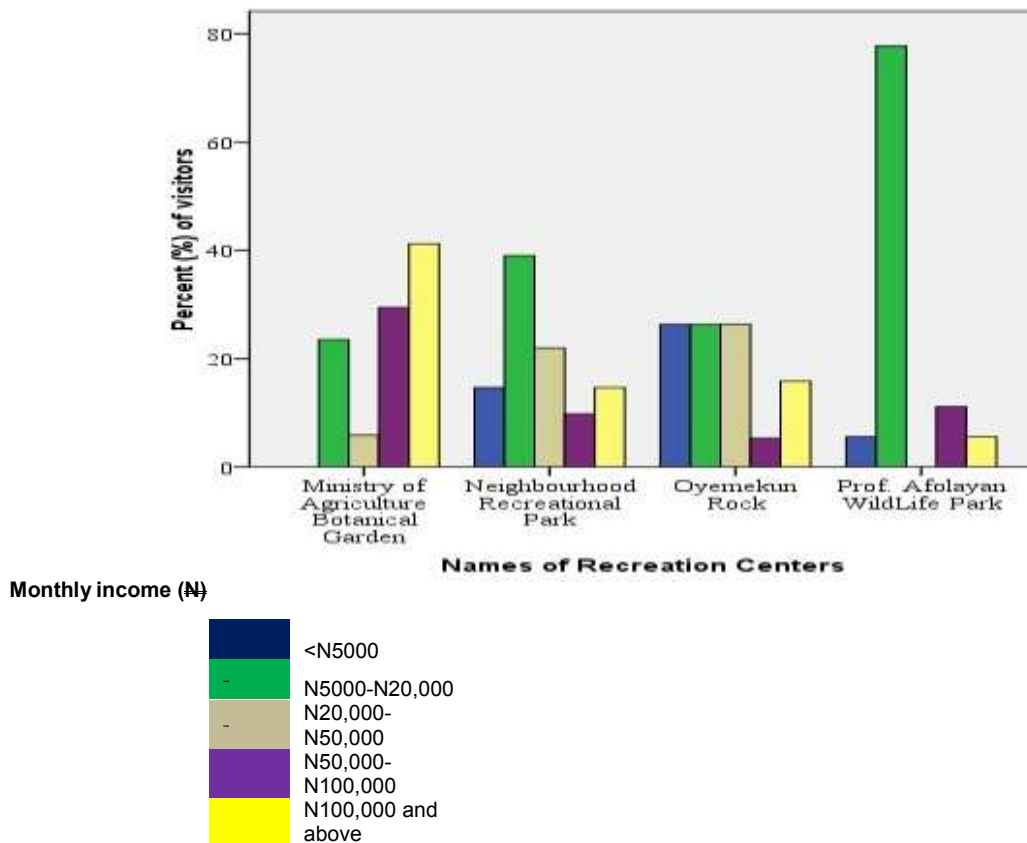


Fig. 4. Income

3.3 Purpose of Visit

Highest proportion of visitors to Ministry of Agriculture Botanical Garden went for relaxation unlike the patronage to Neighbourhood Recreational Park that was majorly for enjoyment.

The result also revealed that relaxation is the main reason visitors to Oyemekun rocks patronise the centre while greater percentage of the visitors to Prof. Afolayan Wildlife Park are for sightseeing (Fig. 5).

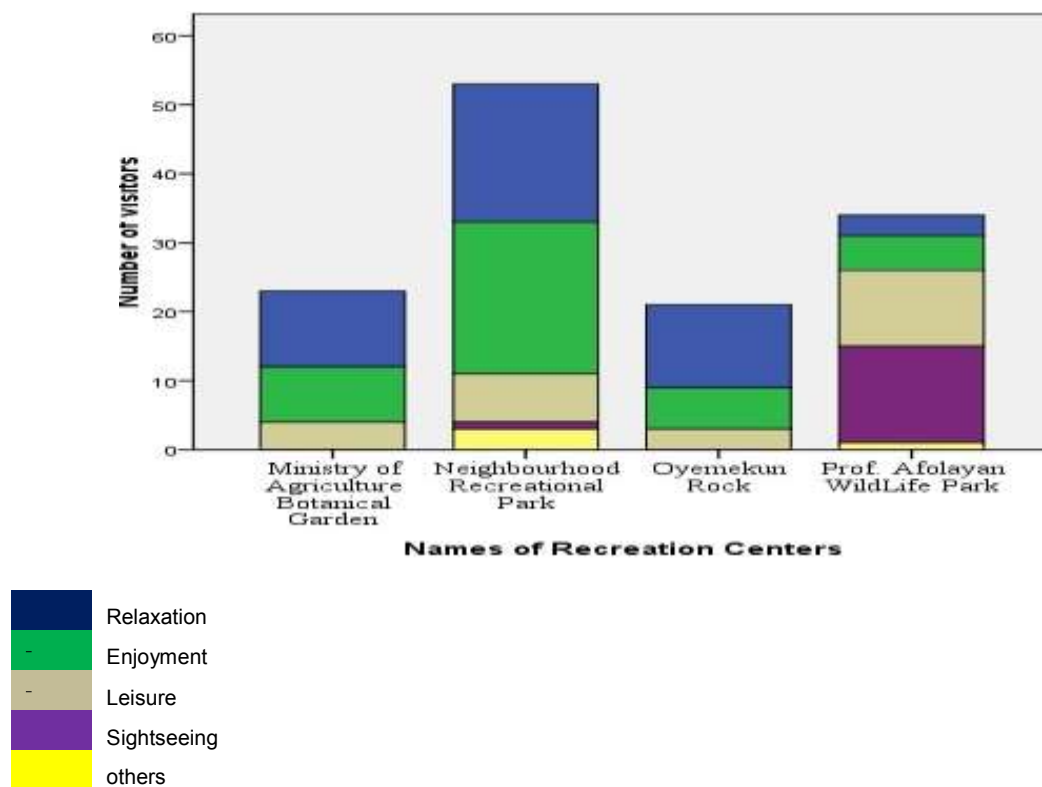


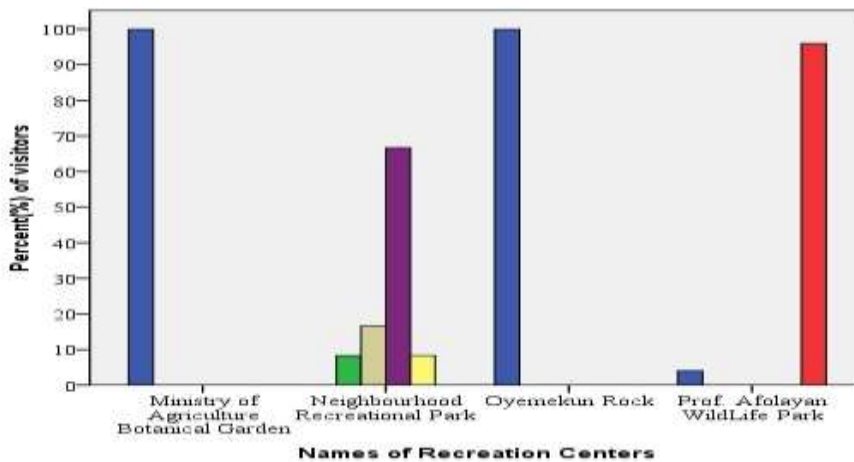
Fig. 5. Purpose of visits

3.4 Major Attraction

The natural environment in both Ministry of Agriculture Botanical Garden and Oyemekun rock form the major attraction. Neighbourhood Recreational Park has the highest number of attractions which include the Basketball court, DSTV/Football watching facilities, Snookers and Table tennis. Wild animals that are being displayed in the zoological garden of Prof. Afolayan Wildlife Park forms the major attraction (Fig. 6).

3.5 Quality of Service Offered

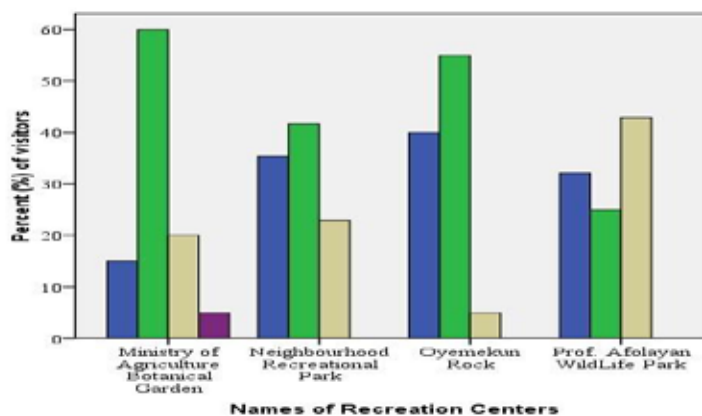
The largest percentage (60%) of the visitors to the Ministry of Agriculture Botanical Garden rated the quality of service provided as good while 5% indicated this to be bad. Majority (41.7%) of visitors in Neighbourhood Recreational Park rated the quality of the service to be good while greater percentage (55%) of visitors in Oyemekun rock rated the service quality to the place to be good (Fig. 7).



Major attractions



Fig. 6. Major attraction to the centres



Quality of service



Fig. 7. Quality of service being offered at the centres

3.6 Preference for the Recreation Centres

The result from the study reveals that security (66.67%) and proximity to the road (33.33%) are the two major reasons visitors preferred patronizing Ministry of Agriculture Botanical Garden. All the visitors to Oyemekun rocks prefer the recreation center simply because the place is close to their home of residence the same thing applicable to what was obtainable in Neighbourhood Recreational Center (68.75%). Visit for educational purpose and game viewing represents the same percentage (50%) for the preference to Prof. Afolayan Wildlife Park (Fig. 8).

3.7 Facilities/Services Enjoyed

The facilities most enjoyed at the Ministry of Agriculture Botanical Garden are the music and bar (33.3%). In Neighbourhood Recreational Park, DSTV facility (23.26%) is the most enjoyed facility unlike Oyemekun rock where the bar represents (35.71%). Animal watching I game viewing represent the greater percentage (58.3%) of the facility being enjoy at Prof. Afolayan's Park (Fig. 9).

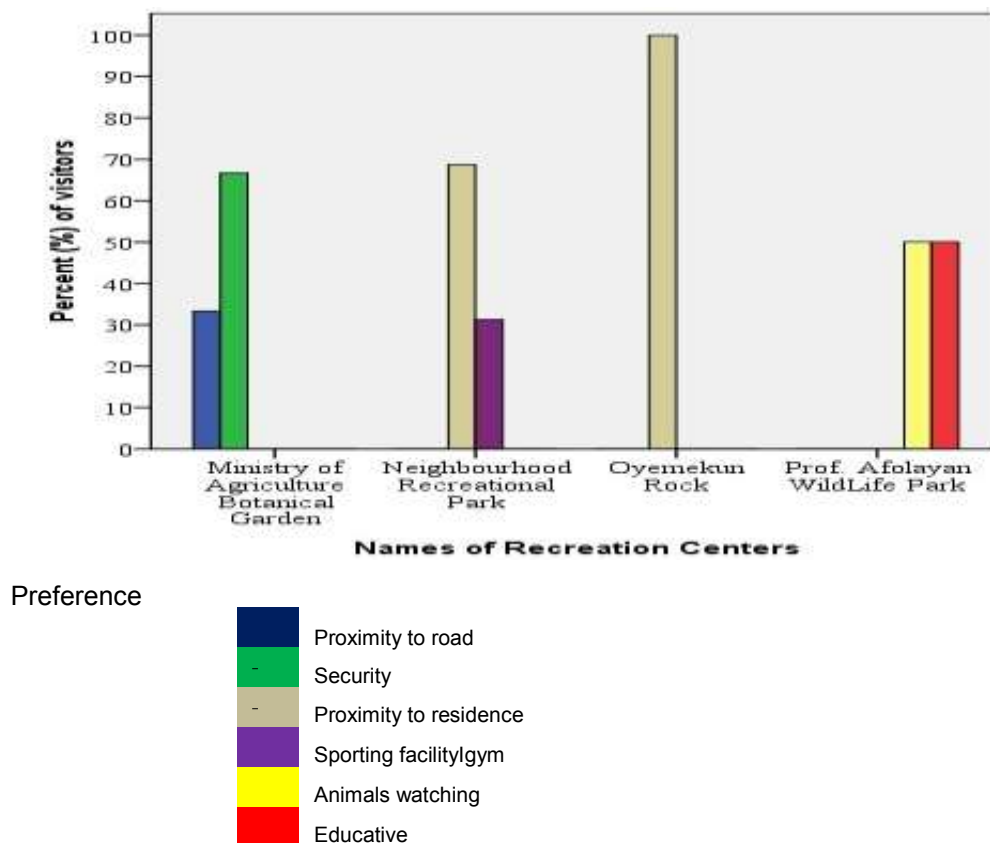


Fig. 8. Preference of visitors to the recreation centers

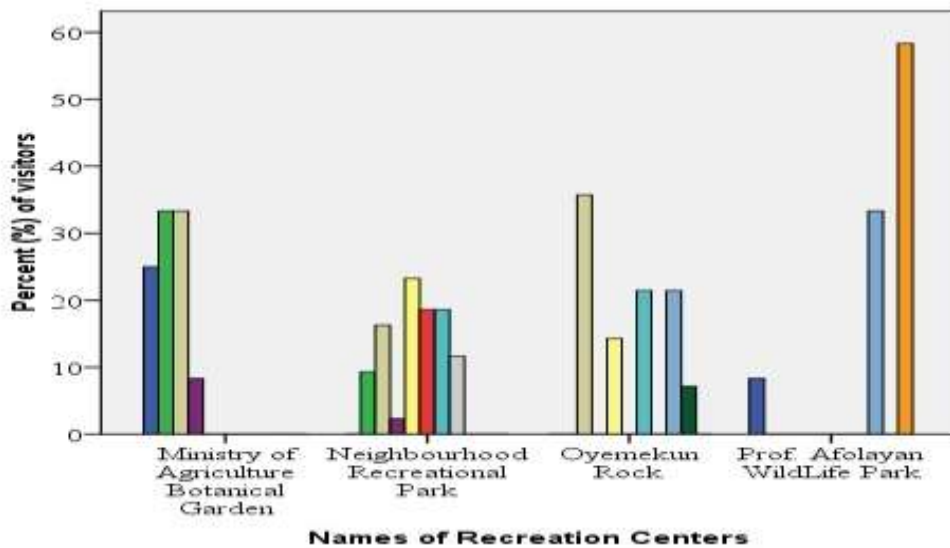


Fig. 9. Facility enjoyed most

3.8 Willingness of Coming Back

The result from the study shows that greater percentages (80%, 90%, 100% and 71.4%) of the visitors are willing to pay back a visit to the all the recreation centres used for the study (Fig. 10).

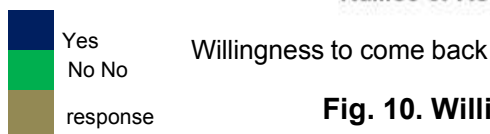
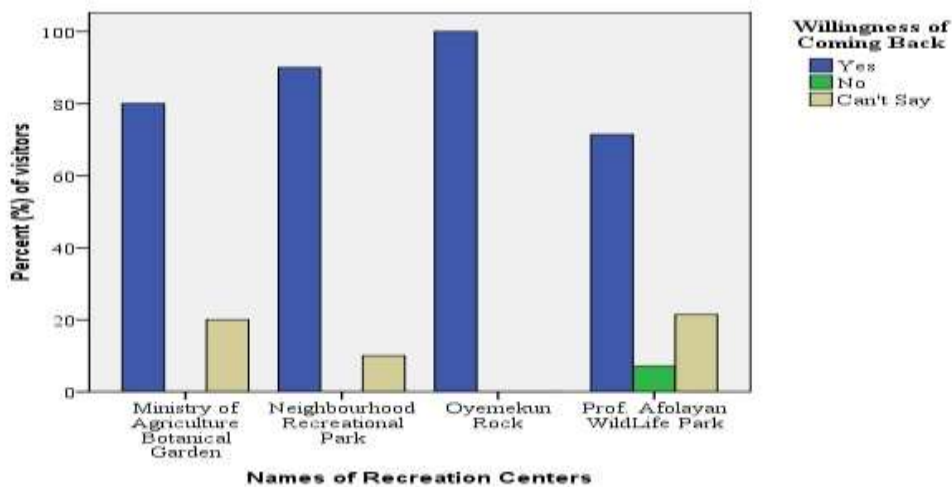


Fig. 10. Willingness to come back

3.9 Visitor's Rating of Major Facilities in Individual Recreation Centre

Major facilities at each of the recreation centres were rated as shown in Table 8.

Table 8. Recreation center rating

Recreation Center	Facilities	Rating of the standard of the facilities		
		Good (%)	Fair (%)	Poor (%)
Botanical Garden	Bar	50	50	0
	Restaurant	50	44.44	5.56
	Swings	23.08	61.54	15.38
Neighbourhood Recreational Park	Bar	74	26	0
	Restaurant	60.42	35.42	4.17
Oyemekun Rocks	Basketball Court	88	10	2
	Table Tennis	75.51	24.49	0
	Snookers	73.91	19.57	6.52
	Bar	85	15	0
	Swings	83.33	16.67	0
Wildlife Park	Indoor Games like Chess, Scrabble etc.	42.11	47.37	10.53
	Swings	47.62	33.33	19.05
	Picnic Site	46.43%	39.29	14.29
	Animal Pen	44.44	48.15	7.41

4. DISCUSSION

There are indications that Akure metropolis, the Ondo-State capital is living to actualize its objective of providing employment, income and other social services for the host communities as capsulize in UNDP, MDGs objectives. It is perceived that harnessing the potentials of the recreational facilities and services in Akure Metropolis as identified in this write up will go along way in addressing one of the critical eight UNDP, MDG objectives which is to eradicate poverty and hunger by 2015 [21]. Tourism development creates employment opportunities for the community, improve their income, reducing poverty and transforming their lives [27,28,29,10]. Information on the demographic characteristics of visitors, purpose of visits, preference and perception, income of the staff etc. are therefore necessary to achieve this aim.

4.1 Demographic Characteristics of the Visitors/Visitor's Profile

This research finding has established that greater percentage of the visitors to all the recreation sites in Akure metropolis were between the age range of 20-30 years and that none of the centers excluding Ministry of Agriculture Botanical Garden receives visitors over 50 years of age and above. This support the findings of [11], that the current data indicates that the predominant age groups who actively participate in outdoor recreation activities are those in the 25-54 bracket, although participation

rates differ from one activity to another. This research study also indicated that patterns of discretionary spending also vary with age. Visitors in the age range of 20-30 years were observed to be low income earners however they constituted greater percentage of visitors to most of these sites with the purpose of watching television, relaxation, enjoyment and game viewing. According to [30] greater population of participant in recreation activities in U.S.A are those in lower age group of between 20-30 years. The authors opined that those around the age of 40 had the least leisure time, likely because of workload and busy taking care of children. More male were found visiting the recreation sites than the female. The margin was so wide in all except in Prof. Afolayan Park where female came with their wards to observe animals and picnicking. This supports the findings of [31] that more males were seen in parks than females (62% vs 38%), and they outnumbered females in all park areas except playgrounds and the track, where the numbers were about equal.

4.2 Assessment of Recreational Facilities and Services

The identified recreational facilities in Akure metropolis can be categorized into two broad types, these are nature based resources and man-made resources or built resources [32]. The nature based facilities include Prof. T.A. Afolayan Wildlife Sanctuary situated in Federal University of Technology, Akure, Alagbaka Botanical Garden at Alagbaka and Oyemekun Rock. The man made facilities include Neighborhood recreation sites in Ilu-nla. Others include Modern and Child Hospitals, ancient Deji's Palace and Mega School. These resources can also be categorized as outdoor and indoor facilities. According to [2] recreation can be classified based on individual's perspective. Prof. Afolayan Park although can be classified as a nature based site it equally offer other attractions for outdoor recreation, game viewing and relaxation. The major attractions being provided in all these recreation centers include natural environment, indoor and outdoor games, basketball courts, watching the television and bar. All these were indicated to be good and satisfying the purpose of visits of the participants for relaxation, enjoyment, leisure and sightseeing. The participants expressed their preference for security and proximity (for those visiting Alagbaka Botanical Garden), closer to their home of residence (Oyemekun Rock and in addition to availability of sporting facilities (gym) for those visiting Neighborhood Recreation Centre) and education and game viewing (for those visiting Prof. Afolayan Wildlife Park). Visitor's preference differs from one Centre to the other and it could

be deduced to be individualistic. According to [24] outdoor recreation brings joy and pleasure to many people, with the provision of appropriate recreational opportunities critical to the satisfaction of an individual's need for cognitive and aesthetic stimulation. The operators of these centers need to improve on the facilities being provided while those being enjoyed most must be maintained others need to be improved on and additional facilities have to be provided to boost their patronage.

4.3 Visitors Perception of the Recreation Facilities

The recreation centres offer quite a good number of services to their visitors. The services being enjoyed most in each of the recreation centres were indicated to include Bar service (drinks) and Music (Ministry of Agriculture Botanical Garden), Watching of football on the television (Neighbourhood recreation Park), Bar service (drinks) (Oyemekun rock) and watching of animal or game viewing (Prof. Afolayan Wildlife Park).

[33] stated that in order to see how tourism affects small local communities, one has to look into the residents' own perceptions of the tourism impacts. According to [34], there have been widespread public links uses of recreational activities to overall happiness, family unity, health, improved educational opportunities and deterrence of crime and substance abuse in America. This has been recognised as the positive contributions or impacts of recreation to quality of life of the participants. The fact that greater percentage of the participants (80%, 90%, 100% and 71.4%) indicated their willingness to come back is a good indication that their satisfaction and purpose of their visits have been achieved [35]. Opined that understanding the reason why tourists return to a destination were fundamental issues for destination managers since revisit could produce more sales revenue and minimise the costs. According to [16] recreation is a discretionary. If it doesn't seem worthwhile, the individual can choose to avoid the experience or to participate somewhere or somehow else. The recreation centres were perceived to be having positive impacts on the social lives of the host communities since the centres offer purposive opportunities for relaxation, enjoyment, watching television, education and game watching or sightseeing.

4.4 Recreational Facilities and Employment Creation

A total of forty staff was observed to be engaged at the four recreation centres visited in Akure Metropolis. Average salary of the staff at each of the centres vary this is because while some are privately owned others are under the control of the government. Average salary of the workers in all these recreation centres was put at N10, 000 I month (\$59). Thus, none of the staff earned less than \$1 per day which is the number one target of UNDP MDG towards addressing Goal number 1 which is to halve between 1990 and 2015, the proportion of the people whose income is less than \$1 a day [21]. Prof. Afolayan Wildlife Park was established as research laboratory for the student in the department of Ecotourism and Wildlife Management and natural resources of the Federal University of Technology, Akure (FUTA). Apart from providing education service for the students and the visitors, money generated from this Park account for greater percentage of Internal Generated Revenue for FUTA annually. Official records on the amount of money being generated at each centre were not disclosed for reasons considered as a way to evade tax and for security. All these are good indications of the economic impacts of recreation to provide job for the host communities and also improve their income [36].

5. CONCLUSION

Akure Metropolis is endowed with natural and man-made recreational resources that are of social and economic importance to the host communities. It is one of the UNDP MDGs Cities in Nigeria with necessary potential to realise if not all but one and the foremost goal of eradicating poverty and hunger by year 2015. This research output will serve as blueprint and developmental road towards realising this objective.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Differences in Perceptions among Managers, Academics and Students of the Importance of Various Aspects of Marketing Knowledge and Skills

ABSTRACT

Aims: Knowledge and skills needed to be possessed and used by marketing practitioners in order to improve marketing management and firm performance are identified in this paper.

Study Design: The data from a survey, where marketing managers, academics and senior students in Slovenia took part, relating to the essential skills for working as a marketing manager, were analyzed by the analysis of variance in order to assess the extent of convergences or divergence among the responses of the three groups.

Place and Duration of Study: The study was conducted in companies in Slovenia, between March 2013 and May 2013.

Methodology: It was decided that a questionnaire-based survey would be the most appropriate way to gather primary data, as it would allow a comparison of the opinions of samples of marketing managers, academics and students. The questionnaire for business respondents was distributed by e-mail to a single respondent in each firm, generically described as the “marketing manager“. Third and fourth year marketing students at the different faculty in Slovenia received a shorter version of the questionnaire, excluding the section relating to managers knowledge and skills. The questionnaire for students respondents was also distributed by e-mail. Additionally, faculty members were asked to distribute a version of the questionnaire throughout their departments. The questionnaire for marketing academics respondents was also distributed by e-mail. Total sample size was 375.

Results: In general we can say that marketing professionals widely used marketing knowledge and skills. However, the academic marketing knowledge only is not enough for a successful work in the marketing department. For a successful transfer of knowledge into practice it is necessary to gain more skills.

Conclusion: The study reports the opinions on a vital aspect of marketing education shared by the three stakeholder groups. The study could easily be replicated in other countries and other institutions for assessing the generalizability of the results.

Keywords: knowledge management; marketing knowledge and skills; education; marketing management.

1. INTRODUCTION

The practice of marketing management is continually changing as it reflects the organizational, scientific and technological, economic, and social contexts in which it is embedded. As a constantly evolving discipline, academic marketing should keep up with these changes. Marketing educators must not only impart timeless marketing principles to students, they must prepare them for real world where this changes are taking place. Moreover, some academic research should address the current concerns of marketing practitioners reflecting these changes [1]. The first section of the paper presents a marketing mix concept and 360° marketing concept like two important paradigms in marketing context.

1.1 Marketing Mix and 360° Marketing Concept

The marketing mix management paradigm has dominated marketing thought, research and practice since it was introduced almost 40 years ago. Marketing, the way most textbooks treat it today, was introduced around 1960. The concept of the marketing mix and the Four Ps of marketing — product, price, place and promotion (Fig. 1) — entered the marketing textbooks at that time. Marketing Association, in its most recent definition, states that “marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchange and satisfy individual and organizational objectives. The marketing mix refers to the set of actions, or tactics, that a company uses to promote its brand or product in the market. Eventually the four P of the marketing

mix became an indisputable paradigm in academic research, the validity of which was taken for granted. For most marketing researchers in large parts of the academic world it seems to remain the marketing truth even today [2].

The second important marketing concept is 360° Marketing (Fig. 2) is an “all around-view” on all marketing activities. Concept 360° originates from management and is largely understood within the periphery of them an agement studies as feedback on the staff and the parties concerned. View 360° aims to streng then the success and competitiveness of an enterprise by means of an "all around-view". Marketing with 0° view has the same function: By means of an "all around-view" all marketing activities are coupled in a single perspective and are combined for a successful dealing.



Fig. 1. Marketing mix – 4P

This includes the traditional thought on marketing, the new challenge of marketing activities in the Web 2.0 or of customer relationship management and the fact that new marketing approaches are characterized by exceeding designing and inter active communication. 360° Marketing is the marketing, which integrates different marketing options for an effective marketing. 360° Marketing connects the marketing activities of an enterprises with the marketing options that emerge as a result of the markets, the customer sand through the new media. 360° Marketing helps the marketing experts to manage the balance in the use of different media. 360° Marketing open the horizon to numerous media and leads the marketing expert in the marketing world of tomorrow through a new attitude and practical approach. Principle of all round-view 360°. Marketing motivates the marketing expert to have an integrated view of

new possibilities of marketing with digital media based on the traditional marketing activities [3].

1.2 Marketing Knowledge

Marketing knowledge is the foundation of marketing discipline, but a general definition of marketing knowledge is difficult to establish [4]. A detailed definition of marketing knowledge is very important for its further development. As early as 1988 the American Marketing Association (AMA) stated in its report that there was a lack of effort aimed at the systematic development of marketing knowledge and so it triggered a debate on the generation, transmission and use of marketing knowledge [5]. Rossiter [4] listed four types of marketing skills, namely: marketing concepts, structural frameworks, strategic and research guides.

Later [6], on the initiative of his colleagues, added a fifth form, namely empirical generalizations. According to his opinion, marketing knowledge is developed and expanded by academics and consultants, companies and managers. He assumed that the marketing knowledge is declarative ("know-what"), which means that it is based on facts, it is a separate entity and thus independent from the individual's ability to apply this knowledge in practice. From his definition of marketing knowledge he also excluded tacit knowledge (values, beliefs, ideas, experience), data and individual's ability or general mental ability respectively.

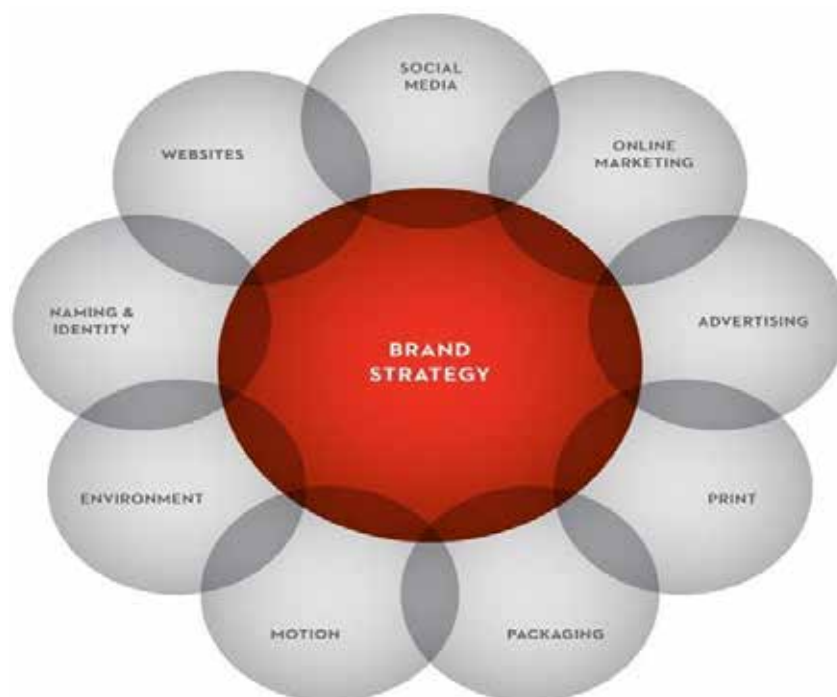


Fig. 2. 360° marketing concept

Following the publication of Rossiter's definition of marketing knowledge his writing was strongly criticized. He was blamed for Rossiter [4] limiting his definition too much, as certain forms of marketing knowledge such as empirical facts, generalizations, laws and theories (e.g. the theory of consumer behavior) [7] were excluded from the definition. He was also criticized for not considering the knowledge on the implementation of marketing [8] and organizational skills and for limiting his definition to the academic marketing knowledge only, which is a synonym for so-called marketing science [9] Wierenga [9] believed that "restricting the marketing knowledge to the academic marketing knowledge is unnecessary and counter-productive and that in practice more than just encoded knowledge derived from systematic academic researches is available to marketing decision makers. He believed that the marketing science only (academic marketing knowledge), as a relatively young discipline, currently cannot provide a sufficient level of knowledge and guidance to marketing professionals for successful work in practice. Wierenga [9] also defines the marketing knowledge as: "All the insights and beliefs regarding marketing phenomenon used by marketing managers for the purposes of marketing decision-making". Marketing skills were then divided into the academic marketing knowledge and the skills used by marketing professionals in practice (Fig. 3).

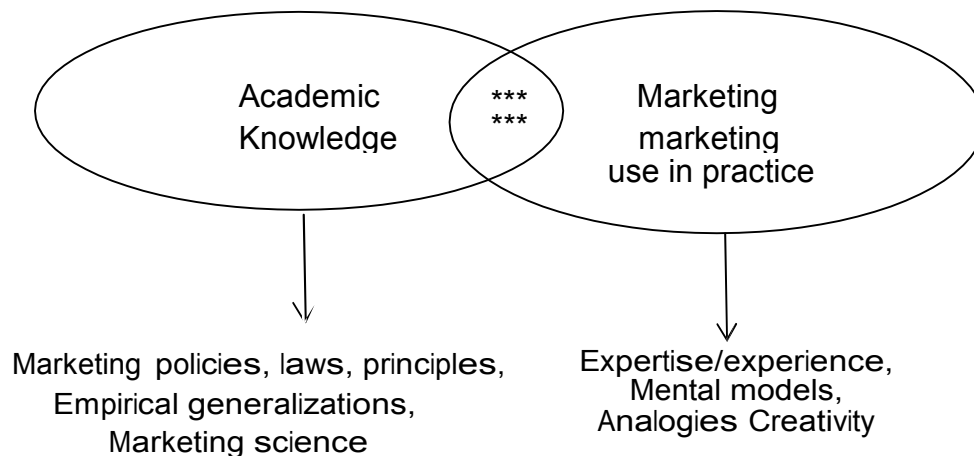


Fig. 3. Diagram of academic marketing knowledge and marketing knowledge that marketing professionals use in practice

Source: [9]

Wierenga identified the academic marketing knowledge similarly as Rossiter, but he added empirical generalization and knowledge that used by marketing professionals in practice. Wierenga believed that the marketing professionals have a lot of experience in practice, which deepens their expertise. In addition, mental models, although subjective, qualitative and incomplete, are available to them and nevertheless help them to identify and resolve problems. In practice, the marketing professionals solve problems in different ways and use a variety of skills, including the soft ones. Classification, developed by Wierenga [9], lists four ways of solving problems and decision-making, namely:

- o Optimization, where the a marketing professional looks for the best possible solution;
- o Ruling, where a marketing professional uses mental models;
- o Searching for analogies/similarities, where the marketing professional tries to remember a similar problem and the solutions from the past that helps him to solve a new problem;
- o Creativity, where a marketing professional tries to find new ways of solving problems.

Each marketing professional decides on his own decision how he is going to solve a particular problem, as each individual has a different approach to the resulting problem. Often a combination of different ways is used. Optimization is definitely important, as well as similarity searching. From our perspective certainly all aspects are connected. In an organization the marketing knowledge is associated with the gaining, transmission and storage of information about customers, their preferences, competitors' products. It is generally believed that the marketing knowledge is useful in practice. When remembering the upper section on dividing the marketing knowledge to the academic knowledge and knowledge used by the marketing professionals in practice (Fig. 1), we are primarily interested in the extent to which the academic marketing knowledge may be useful in practice. If marketing is look at as a business function, then the marketing knowledge must be useful and must help companies in understanding its consumers and the business environment. Some authors see marketing as a science which originates from practice and therefore is, or should be, particularly useful function.

1.3 Marketing Skills

Skills can be divided into professional and supporting ones. Professional ones are developed by using the expertise (skills of marketing planning, market segmentation, and developing pricing strategies). Supporting skills can be used without expert knowledge. These skills can be used in different jobs. These skills include communication, interpersonal and decision-making [10]. Often, supporting skills are called managerial skills, because they contribute to the efficiency and flexibility of each individual. In an organization each individual should possess skills for working in a team and problem solving skills. Marketing professionals working in marketing, they should have the following skills:

- o Communication skills [27] — we can talk about three types of communication skills, namely: 1. Speaking skills, ability to convince and active listening (public speaking, communication, ability to explain if any conflict arises for example). 2. Writing skills and ability to understand (writing reports, analyses, marketing plans, emails for example). 3. Collecting and analyzing information – information literacy (collecting data qualitatively and processing these data correctly, proper reading of information from tables and figures for example).
- o Analytical skills - in reviewing the literature, it was found that individuals have under-developed analytical skills. Among the latter the ability to work with larger numbers, data, using various statistical tools, understanding data accuracy and reliability, ability of systematic thinking [3] are included.
- o Ability to use modern technology - particularly ability to impeccably use computer tools (Word, Excel, email, internet, social networks, R-commander, Power Point for example). It is important to know how using these tools can make work easier and how they can help in marketing business. A person, who knows how to use all the modern technology and, besides this, has strong analytical abilities, has significant competitive advantage in the job market [23].
- o Interpersonal skills - are essentially needed in marketing, since a marketing professional operates in the internal as well as external environment of an organization. These skills are the following: understanding differences among individuals, working in a team and ability to solve problems.
- o Leadership [5] – including predicting, strategic thinking, ability to motivate, delegating, leading various teams, ability to solve conflicts and crises.

- o Ability to plan and organize — both are strongly associated with preparing and carrying out marketing plans. These skills include ability of systematic thinking, predicting, ability of time management, having a vision for example.
- o Decision making skills - it is important to back up a particular fact when making a decision. In decision making it is important to have ability to assess risks in a given situation.
- o Creativity — it is essential for market functioning. It is used to identify a problem and in its practical solving. To successfully search creative solutions a reference frame and knowledge of problem solving is needed. All these must be supported by clear objectives.

Many authors have previously stated what kind of knowledge and skills marketing professional should possess. If we want to highlight the most important abilities for marketing decision-making, a vision, creativity, leadership, communication skills, motivation, prudence, organizational skills, intuition, adaptability, analytical thinking, persistence, dedication, knowledge and acquaintance should be emphasized. It is also important that nowadays a marketing professional looks for relevant information important for his work. A marketing professional needs to quickly identify business trends and to respond to it immediately. A good marketing professional builds a good relationship with a marketing team and among departments in the whole organization. He proposes new ideas for marketing to his colleagues. In practice, use of certain skills depends on various environmental factors (size of an organization, activities for example). The essence of knowledge is knowledge of marketing communication, market research and analyzing as well as consumer behavior. A good marketing professional is more effective if he takes into account knowledge and skills he needs.

In Table 1 [15] definitions of the required knowledge and skills are summarized. This list is one of the most comprehensive found in the literature reviewed. From the perspective of our environment and for the purpose of this article precisely this survey is the most interesting one, as it clearly defines and widely enough explains marketing expertise and skills. In comparison to other studies (usually carried out in the U.S.) the advantage has also been made in New Zealand, a small open economy with strong European, Pacific and Asian links and is therefore somewhat more relevant to our situation.

Table 1. The definition of the necessary knowledge and skills for marketing professionals

Knowledge	Skills
Strategic marketing	A willingness to learn
International and export marketing	Teamwork skills
Business to business marketing	Oral communications skills
Consumer behavior	Written communications skills
Product and brand management	The skills to plan their own work
Pricing	Problem solving ability
Market research and analysis	Self-confidence
Personal selling and sales management	Independent judgment
Societal and Ethical issues in marketing	The ability to be creative
Innovation and new product development	The skills to implement change
Services marketing	A multi-disciplinary perspective
Marketing logistics/distribution logistics	Analytical skills
Marketing communications	Flexibility and adaptability Retail
Marketing and management	An awareness of ethical issues
Direct marketing	Strong interpersonal skills
Internet marketing	

Source: [15]

Table 1 shows knowledge and skills that a marketing professional should possess according to Gray et al. [15]. A good marketing professional is more effective when taking into account knowledge and skills needed for his work. Of course, it is important to having already developed certain skills. Some skills are gained over a certain period of time when a marketing professional is in business for a long time.

In the next section, relevant previous researches that have been focused on managers, educators and/or students are reviewed. Then the research methodology is discussed and our findings are presented, together with their implications.

1.4 Relevant Previous Researches and Hypotheses

Over the past two decades, a number of studies have identified differences between managers and academics views about what should be taught in business schools [16,17,18]. Educational gaps have been found to exist across a range of business disciplines, including international business [16], accountancy [19], marketing research [20], and MBA programs [21]. These studies highlight a general concern that marketing and other business graduates should have good oral and written communication skills. Analytical and problem-solving skills were also mentioned in several studies [22,23,24,25,19]. One recent study suggests that communication and problem-solving skills, and the ability to think logically and

work in teams, are more important for marketing assistants than specific discipline-related or other technical knowledge and skills [26]. Technical and product knowledge may become more important later in their careers [27]. This implies that the ability to learn is an important attribute for all marketing professionals, not just marketing graduates. On the other hand, some employers may perceive marketing and business education to be too theoretical and not practical enough [16,18,28], meaning that discussion of concepts, models and debates in the academic literature is perceived to take precedence over the development of softer or transferable skills, over more job-related knowledge and skills, or indeed over both types of skill. However, this dilemma is not easily resolved in a university context where emphasis is often placed on developing inquiring and critical minds rather than transferable skills. Exceptions may include accounting and market research courses, where technical knowledge and practical skills can also be important components. The study now reported builds on the extant literature, but takes a more holistic approach than many previous studies by assessing a broader array of "softer" and "harder" knowledge and skills. The aim is to identify those that are essential for marketing graduates to possess, if they are to be appointed as marketing assistants in the shorter term and to become effective marketing managers in the longer term. Only a few of the previous studies have concurrently assessed the views of managers (as prospective employers), academics and students — a shortcoming that the current study also addresses [15].

1.4.1 Research hypotheses

Based on the secondary data collected in the literature, the following hypotheses have been formed:

- o H1: The most important skills among the overall skills areas in the work of marketing professionals are "Strong interpersonal communication skills", "A Willingness to learn", "Problem solving ability", "Written communications skills", "Ability of creative thinking" and "Ability to teamwork".

- o H2: Key characteristics of a good manager's skills are good leadership skills, organizational skills, ability to think strategically, wide awareness and understanding a business and a customer service focus.

o H3: The most important knowledge areas for a successful work of a modern marketing professional are marketing communication, product and brand management, consumer behavior and strategic marketing.

o H4: More than 80% of managers and more than 70% of academics state that in the process of formal education marketing professionals have to obtain the necessary skills and training to work quality and to solve the situation in the market.

2. METHODOLOGY AND SAMPLE

It was decided that a questionnaire-based survey would be the most appropriate way to gather primary data, as it would allow a comparison of the opinions of samples of marketing managers, academics and students. The questionnaire for business respondents was distributed by e-mail to a single respondent in each firm, generically described as the "marketing manager". Usable questionnaires were received from 125 businesses. Third and fourth year marketing students at the different faculty in Slovenia received a shorter version of the questionnaire, excluding the section relating to managers knowledge and skills. Usable questionnaires were received from 225 marketing students. The questionnaire for students respondents was also distributed by e-mail. Additionally, faculty members were asked to distribute a version of the questionnaire throughout their departments. Completed returns were received from 25 marketing academics. The questionnaire for marketing academics respondents was also distributed by e-mail. Total sample size was 375. All data were analyzed using SPSS version 12.0. Results are presented as simple means and percentages, so as to aid comparison between groups of different sample sizes. One-way analysis of variance (ANOVA) tests were conducted to assess whether any differences between the mean ratings (as opposed to rankings) of skills and knowledge areas by each group were statistically significant at the 95 percent confidence level. Additionally, the Scheffe and Tukey post hoc tests were applied to the results, to verify conclusions.

The profile of respondents shows that 55% of the managers who responded had spent up to five years in their current positions, almost half of them having the title marketing manager. More than 66% held university qualifications, 23% percent at bachelor's degree level and 11% percent post-graduate. The largest proportion worked in communications, followed in fast moving consumer goods, retail, food

products, finance and banking and professional services. The student sampling frame comprised the third year of the bachelor's degree, fourth and final year of the honours degree and first year of the master's and second year of the doctoral's degree, all at the different faculties in Slovenia. 55% of the faculty members who responded had been teaching marketing for up to eight years. The most common teaching areas were general marketing, consumer behavior and brand management accounting for around a half of the total each.

3. RESULTS

3.1 The Importance Skills for Successful Work of Marketing Professionals

Marketing managers, students and academics were all asked to rate how essential a wide variety of skills were for successful work of marketing professionals on a scale from 5 = 'essential' to 1 = 'not essential'. The results are presented in Table 2. Academics and managers agree that strong interpersonal communication skills and willingness to learn are the most important skills that marketing professionals should possess. They ranked teamwork and written communication skills as third and fourth most important skills.

Table 2. The importance of skills areas for successful work of marketing professionals

Skills for marketing graduates	Mean responses			
	Marketing managers	Students	Academics	Post hoc test results Differences*
Strong interpersonal communication skills	4.76 (0.58)	4.62 (0.76)	4.69 (0.59)	None
A willingness to learn	4.66 (0.66)	4.54(0.73)	4.65 (0.70)	M>S*
Written communication skills	4.54 (0.69)	3.85 (0.80)	4.56 (0.70)	M, A> S*
Problem solving ability	4.26 (0.63)	4.50 (0.72)	4.22 (0.73)	None
Flexibility and adaptability	4.23 (0.71)	4.25 (0.71)	4.10 (0.89)	None
The ability of creative thinking	4.28 (0.81)	4.48 (0.77)	4.15 (0.73)	S>M, A*
Ability to teamwork	4.56 (0.76)	4.65 (0.62)	4.57 (0.83)	S>M, A*
Strategic to think and plan	4.25 (0.56)	3.82 (0.66)	4.12 (0.65)	M>S*
Accountability and responsibility	4.19 (0.78)	3.79 (0.54)	3.99 (0.65)	None
The ability to motivate and inspire others	4.21 (0.67)	3.81 (0.90)	4.0 (0.45)	None
Skills to plan their own work	4.16 (0.71)	3.76 (0.75)	3.97 (0.86)	None
Multi-disciplinary perspective	4.11 (0.82)	4.15 (0.80)	3.95 (0.96)	S>M, A*
An awareness of ethical issues	3.90 (0.90)	3.72 (0.78)	3.33 (0.99)	S>M, A*
Ability to use modern technology	3.82 (0.92)	3.87 (0.65)	3.85 (0.76)	S>M, A*
Analytical skills	3.76 (0.88)	3.76 (0.77)	3.79 (0.92)	None
Self-confidence	3.70 (0.67)	3.70 (0.89)	3.65 (0.78)	S>M, A*

Note: * Significant at 95 percent confidence level; M – marketing managers; S – students; A – academics; figures which are given in parentheses are standard deviations

These rankings are in line with many of the previous studies of graduates marketing and business skills cited in Gray et al. [15]. Students also rated strong interpersonal communication skills and willingness to learn relatively highly, but thought teamwork was the most important skill.

Problem solving and ability of creative thinking were rated on fourth and fifth. Comparing their rankings with those of employers and academics suggests that more emphasis should be placed on the development of written communication skills, in particular.

Based on the presented results in Table 2 the hypothesis 1 was confirmed. It is clear that there are significant differences in the views of the three groups as to how essential a number of skills are. Marketing managers consider a willingness to learn to be more important than students do, while both managers and academics rate written communication skills significantly higher. For their part, students place significantly greater emphasis than academics and managers on teamwork, self-confidence, and ability of creative thinking, multi-disciplinary perspective, awareness of ethical issues, and the ability to use modern technology. Similar views were held by all three groups about the strong interpersonal communication skills, flexibility and adaptability, accountability and responsibility, problem solving, analytical skills, the ability to motivate and inspire others and the ability to plan their own work. It is worth noting that there appear to be few differences in the perceptions of marketing managers and marketing academics. This suggests that academics and managers share beliefs about the importance of the softer and harder skills that graduates require. One could assume, then, that academics would build the development of these skills into their undergraduate courses.

Table 3. The importance skills for marketing managers

Manager's skills	Rating mean
Leadership skills	4.72
The ability to think strategically	4.66
Organizational skills	4.46
Wide awareness and understanding of business	4.45
Written communication skills	4.41
Customer service focus	4.40
Planning skills	4.27
Problem solving ability	4.19
Negotiation skills	4.16
Sales management skills	4.12
Oral communication skills	3.99
Flexibility and adaptability	3.96
Able to work under pressure	3.89
A multi-disciplinary perspective	3.86
The ability to be creative	3.77
Analytical skills	3.71
The skills to implement change	3.66

In the next step, Marketing managers, only, were asked to indicate on a scale, from 5 = 'essential' to 1 = 'not essential', how important it was for managers to possess a selection of skills, and to nominate the three most important. Table 3 shows some disparity in answers to the two questions. Asked to rank importance, the skills that marketing managers mention most frequently are leadership skills, the ability to think strategically, organizational skills, wide awareness and understanding of business, and a customer service focus. It may be that although marketing managers need a wide variety of skills to carry out the various marketing functions, those that they rate most highly relate more to their roles as leaders and managers of marketing teams or departments. Based on the presented results in Table 3 the hypothesis 2 was confirmed.

We find that here as in the rest of the world valued slightly higher than the overall ability of specific marketing skills and knowledge. This fact is a bit of concern, as it is for some authors found [29], that there is a lack of recognition capability, which would be specific for marketing. Higher than normal in the (foreign) research falling overall socio-ethical views, such as reliability, responsibility, ethics indicating an awareness that marketing professionals have in their work and in contact with consumers. Among the least important were ranked as more specific knowledge and skills in the field of marketing. Compared with foreign research are primarily low grade knowledge on customers (to provide consumer behavior, using a database of customers), which represents a potential weakness Slovenian marketing professionals. We find, therefore, that marketing professionals are seen as particularly important general skills are less important analytical skills. In the future, when the market has become more analytical and measurable results, you may experience difficulties in adapting to these changes. It can also be a problem ignorance of consumers and evaluating knowledge and skills in the field of knowledge of consumers as unimportant. Focusing on the customer is becoming increasingly important, and his lack of knowledge can lead to poor performance of the company.

3.2 The Importance of Knowledge Areas for Successful Work of Marketing Professionals

Respondents were asked to rank the top three knowledge areas. Managers and academics rated marketing communications most highly, followed by product and

brand management and consumer behavior. Students ranked strategic marketing first, followed by marketing communications, consumer behavior, product and brand management and innovation and new product development. The variation in rankings across the groups seen in Table 4 suggest that marketing managers place strong emphasis on marketing communications, product and brand management, consumer behavior, international and export marketing, business-to-business marketing, strategic marketing and public relations marketing. Academics, on the other hand, emphasize marketing communications, product and brand management, consumer behavior, international and export marketing, business-to-business marketing and personal selling and sales management. Students place strong emphasis on strategic marketing, and consumer behavior. Based on the presented results in Table 4 the hypothesis 3 was confirmed.

Table 4. The importance of knowledge areas for successful work of marketing professionals

Knowledge areas	Marketing managers	Mean responses			Post hoc test results Differences*
		Students	Academics		
Marketing communications	4.46 (0.96)	4.47 (0.77)	4.44 (0.88)	None	
Product and brand management	4.38 (0.87)	4.40 (0.78)	4.39 (0.79)	S > M*	
Consumer behavior	4.16 (0.77)	4.46 (0.56)	4.36 (0.76)	S > M*	
Strategic marketing	3.86 (0.94)	4.58 (0.71)	3.99 (0.99)	S > M, A*	
International and export marketing	3.99 (1.04)	4.16 (0.96)	4.11 (0.97)	S > A > M*	
Business to business marketing	3.96 (0.78)	4.11 (0.76)	3.92 (0.79)	None	
Public relations	3.90 (0.67)	3.99 (0.35)	3.79 (0.69)	None	
Pricing	3.40 (1.07)	3.87 (0.79)	3.41 (0.98)	S > M, A*	
Market research and analysis	3.38 (0.79)	3.95 (1.78)	3.36 (0.84)	None	
Personal selling and sales management	3.34 (1.20)	3.85 (0.80)	3.79 (0.97)	S, A > M*	
Societal and Ethical issues in marketing	3.30 (1.05)	3.79 (0.75)	3.21 (1.19)	S > A*	
Innovation and new product development	3.29 (0.99)	4.36 (0.76)	3.18 (0.78)	S > M, A*	
Services Marketing	3.28 (1.12)	3.69 (0.75)	3.56 (0.92)	None	
Marketing logistics/distribution logistics	3.22 (0.97)	3.68 (0.77)	3.46 (0.86)	S > M, A*	
Retail marketing and management	3.21 (0.99)	3.76 (0.78)	3.39 (0.69)	S > A > M*	
Direct marketing	3.19 (0.87)	3.45 (0.89)	3.16 (0.77)	None	
Internet marketing	3.16 (1.06)	3.35 (1.15)	3.101 (1.19)	None	

Note: * Significant at 95 percent confidence level; M – marketing managers; S – Students; A – Academics; figures which are given in parentheses are standard deviations

Taken in tandem, the results presented in Tables 3 and 4 suggest that academics should place slightly more emphasis on the key knowledge areas that employers value, and which appear to reflect current market conditions. However, a neces-

sary caveat is that academics who teach undergraduate students must also be aware that they are training future managers and not just future marketing assistants. Thus, it is also important to take note of the essential knowledge and skills that managers require [15].

In the next step Managers were also asked to rate the importance of various kinds of knowledge on the same scale from 5 = 'essential' to 1= not essential, and again to rank the three most important categories. Table 5 shows that the knowledge areas considered to be most important by marketing managers are marketing communications, product and brand management, consumer behavior, and, closely followed by strategic marketing, and international and export marketing. The rankings seem to reinforce the ratings.

Table 5. The importance skills for marketing managers

Knowledge areas	Rating mean
Marketing communications	4.67
Product and brand management	4.54
Consumer behavior	4.47
Strategic marketing	4.23
International and export marketing	4.19
Business to business marketing	3.99
Public relations	3.88
Innovation and new product development	3.65
Pricing	3.46
Market research and analysis	3.39
Personal selling and sales management	3.33
Societal and Ethical issues in marketing	3.29
Marketing logistics/distribution	3.26
Retail marketing and management	3.23
Direct marketing	3.16
Internet marketing	3.14
Services marketing	3.12

Using the following questionnaire the following was determined: Do, in a process of formal education, marketing professionals obtain the necessary skills and training to work quality and solve the situation in the market? Students did not answer this question. To sum up opinions of the respondents they stated that 89% of managers and 75% of academics think that only a formal knowledge is not enough and a multi-year practice in the field is required, where a marketing professional is faced with falling, rising, with denials and competition. Respondents believe that the formal knowledge is not enough, because it usually turns out that a prospective marketing professional, who reaches excellent reviews in the formal education, tends to "freeze", when it comes to achieving excellent results in the field. This happens, because he is not used to rejecting and because he takes rejection too personally. The market is constantly changing, so a marketing professional should respond to

it properly. Based on the literature review and the research carried out it can be concluded that the academic marketing knowledge only is not enough for a successful work in the marketing department. It is necessary to gain more skills to successfully transfer knowledge into practice. Individuals in the workplace depend on characteristics of an organization, which may prevent/promote their development and use of his skills and abilities. In addition to knowledge and skills, in today's unstable and unpredictable environment it is also important to understand the systems around us broader and to understand the complexity of the relationships that are created within these systems. Based on the presented results the hypothesis 4 was rejected.

The results of our study are very similar to the results of the market research, conducted under the auspices of the Institute of Marketing, Faculty of Economics [30] and the market research carried out in New Zealand by Gray et al. [15]. The comparison of the results of both of the researches carried out, it can be said that in marketing area in Slovenia the current state of marketing knowledge and skills has not significantly changed in the last few years.

4. CONCLUSION AND IMPLICATION

This study is one of the most comprehensive empirical investigations to date of the capabilities that marketing professionals require being successful in the twenty-first century. Overall, there appears to be reasonably broad agreement between Slovenian marketing managers and marketing academics about the skills and knowledge that marketing graduates must have if they are to be employed as marketing assistants. There are significant differences in the perceptions of marketing managers, students and academics about some skill and knowledge areas. This suggests that the refinement of current curricula may be in order. For the most part, managers and academics are in agreement over the critical skills and knowledge areas. Based on the literature review and the research carried out we can conclude that only academic marketing knowledge is not enough for successful work in the marketing department. It is necessary to win more skills to be successful transfer of knowledge into practice. Individuals in the workplace depend on the characteristics of the organization that may prevent/promote its development and use his skills and abilities. In addition to knowledge and skills in today's unstable and unpredictable

environment is also important to the broader understanding of the systems around us and understanding of the complexity of the relationships that are created within these systems. Our study could easily be replicated in other countries and other institutions, to assess the generalizability of the results. Efforts should be made to increase sample sizes of managers, students and academics. More research is also required to investigate whether experience alone is sufficient for well-trained junior marketing professionals to acquire the extra knowledge and skills they require to become effective marketing managers, or if marketing academics should be helping them to fast-track their careers by the provision of targeted courses.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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Questions of stability of retail trade in Russia

Abstract: The system of trade is considered. The factors influencing retail commodity turnover of food trade are revealed.

Keywords: structure of trade, stability of trade, reliability, survivability, adaptability.

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Вопросы устойчивости розничной торговли в России

Аннотация: Рассмотрена система торговли. Выявлены факторы, влияющие на розничный товарооборот продовольственной торговли.

Ключевые слова: структура торговли, устойчивость торговли, надежность, живучесть, адаптируемость.

Актуальность исследования устойчивости розничной торговли продовольственными товарами РФ определяется назначением розничной торговли – продажа товаров населению для личного потребления или использования в домашнем хозяйстве. Неустойчивая розничная торговля продовольственными

товарами ухудшит снабжение населения продуктами питания и может привести в самом крайнем случае к социальным потрясениям.

Объект исследования – розничная торговля продовольственными товарами в РФ.

Предмет исследования – факторы устойчивости розничной торговли продовольственными товарами в РФ.

Цель исследования:

- 1) рассмотреть устойчивость торговли как системы;
- 2) выявить факторы устойчивости розничной торговли продовольственными товарами в РФ;
- 3) оценить значимость факторов устойчивости розничной торговли.

Сначала рассмотрим торговлю с точки зрения системного подхода.

Торговля представляет собой сложную экономическую систему [1].

Предложим структуру торговли (рис. 1).

Следуя логике рис. 1, мы приходим к пониманию того, что розничная торговля продовольственными товарами является одной из важнейших подсистем системы «торговля».

Системный подход и элементы теории устойчивости позволят исследовать факторы устойчивости розничной торговли продовольственными товарами РФ [2].

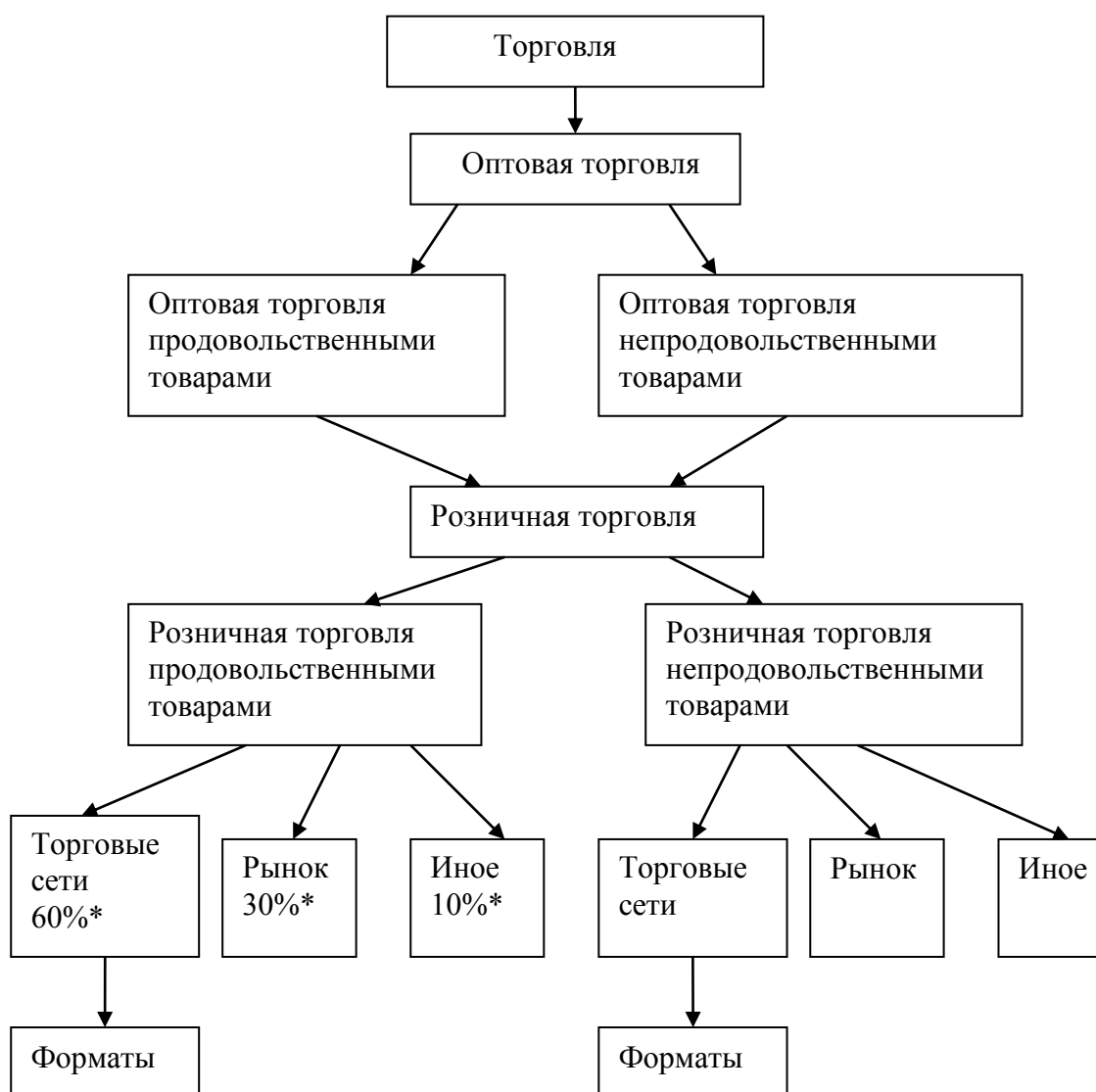
«Фундаментальным свойством систем является устойчивость, т.е. способность системы противостоять внешним возмущающим воздействиям. От нее зависит продолжительность жизни системы» [3].

Назвать торговлю страны простой системой будет некорректно, поскольку простая система состоит из небольшого числа элементов и имеет небольшое число взаимосвязей между ними. Сложная система характеризуется структурной сложностью, сложностью функционирования, сложностью развития и выбора поведения.

В торговле РФ число объектов торговли и общественного питания исчисляется сотнями тысяч, поэтому будем рассматривать торговлю РФ как сложную систему [4].

Итак, торговля страны – это сложная система и для нее характерны активные формы устойчивости – надежность, живучесть, адаптируемость. В си-

стеме «торговля» мы будем рассматривать подсистему «розничная торговля продовольственными товарами».



*- согласно годовому отчету X5 Retail Group 2014. www.x5.ru

Рис. 1. Структура торговли (составлено авторами)

Прежде чем рассматривать структурную устойчивость торговли следует оценить влияние внешней среды [5].

Предложим ряд наиболее существенных факторов, на наш взгляд, влияющих на устойчивость розничной торговли продовольственными товарами в РФ:

- 1) результаты работы агропромышленного комплекса;

- 2) импорт продуктов питания;
- 3) цены на продукты питания;
- 4) доходы населения;
- 5) действие научно-технического прогресса;
- 6) потребительские ожидания;
- 7) налоги и субсидии.

Оценить влияние факторов №№5-7 на розничную торговлю продовольственными товарами в РФ представляется затруднительным. Для факторов №№1-4 существует статистика и, вероятно, можно оценить зависимость розничной торговли продовольственными товарами в РФ от этих факторов.

Результат работы агропромышленного комплекса за 2004-2014 г.г. представлен в [6].

Импорт продуктов питания за 2004-2014 г.г. представлен в [7].

Доходы населения представлены за 2004-2014 г.г. представлены в [8].

Сведем интересующие нас данные в одну табл. 1.

Таблица 1

**Оборот розничной торговли продовольственными товарами
в РФ и факторы, влияющие на него за 2004-2014 г.г.****

№	Год	Оборот розничной торговли продовольственными товарами в РФ, млрд. \$ США	Продукция сельского хозяйства РФ, млрд. \$ США	Денежные расходы на питание, млрд. \$ США/год	Импортные продовольственные товары, млрд. \$ США
1	2004	89,6	46,7	78,9	13,9
2	2005	113,7	52,8	92,1	17,4
3	2006	145,0	63,0	108,5	21,6
4	2007	191,2	78,9	135,6	27,6
5	2008	255,2	99,0	163,2	35,2
6	2009	222,8	80,2	141,1	30,0
7	2010	263,6	86,2	167,5	36,5
8	2011	309,8	117,4	191,7	42,5
9	2012	320,5	107,4	194,1	40,4
10	2013	349,9	115,8	202,8	43,3
11	2014	320,7	109,4	184,6	39,9

** - составлено авторами по данным Росстата

Итак, оборот розничной продовольственной торговли в РФ и факторы, которые, как мы предполагаем, влияют на этот оборот, сведены воедино.

Для упрощения расчетов предположим, что функция оборота розничной торговли линейно однородна по приведенным факторам. Сначала проведем корреляционный анализ.

Таблица 2

Коэффициенты корреляции ***

	Столбец 1	Столбец 2	Столбец 3	Столбец 4
Столбец 1	1			
Столбец 2	0,97914589	1		
Столбец 3	0,99560257	0,9830665	1	
Столбец 4	0,99170218	0,98336188	0,99691781	1

***- составлено авторами

Данные табл. 6 говорят о том, что:

- 1) корреляция между оборотом розничной торговли продовольственными товарами и продукцией сельского хозяйства РФ равна 0,979;
- 2) корреляция между оборотом розничной торговли продовольственными товарами и денежными расходами на питание равна 0,995;
- 3) корреляция между оборотом розничной торговли продовольственными товарами и импортом продовольствия равна 0,992.

Обычно, в таких случаях говорят о сильной прямой связи между результатом (оборот розничной торговли продовольственными товарами) и факторами.

Оценим производственную функцию оборота розничной торговли продовольственными товарами.

$$Y = f(x_1; x_2; x_3), \quad (1)$$

где Y- оборот розничной торговли продовольственными товарами, млрд. долларов США (РТО);

x₁ - продукция сельского хозяйства, млрд. долларов США (С);

x₂ - денежные расходы на питание, долларов США (Д);

x₃ - импорт продовольственных товаров, млрд. долларов США (И);

Оценим функцию оборота розничной торговли продовольственными товарами, применив множественную регрессию.

Таблица 3

Оценка уравнения (1)****

	Коэффициенты	Стандартная ошибка	t-статистика	Множественный R	Нормированный R-квадрат	F-критерий
РТО	-84,407	21,358	-3,952	0,99567	0,99136	267
Сельхозпродукты (С)	0,096	0,705	0,136			
Денежные расходы (Д)	2,332	0,951	2,451			
Импорт (И)	-1,298	3,994	-0,325			

****- составлено авторами

$$РТО = -84,407 + 0,096С + 2,332Д - 1,298И \quad (2)$$

Коэффициент множественной корреляции равен 0,996, это указывает на сильную связь всех факторов с результатом.

Нормированный коэффициент множественной детерминации указывает на весьма высокую (более 99%) детерминированность результата (РТО) в модели факторами С, Д, И.

В нашем случае табличное значение F-критерия $F_{табл} (\alpha=0,05; k_1=3; k_2=7)=4,35$.

$$F_{факт} = 267 > F_{табл} = 4,35.$$

Статистическая значимость всего уравнения подтверждается.

Заключение. Выявлены значимые факторы, влияющие на оборот розничной торговли продовольственными товарами в РФ:

- 1) производство сельскохозяйственной продукции;
- 2) денежные расходы на питание;
- 3) импорт продовольственных товаров.

По результатам проведенного исследования можно сделать следующие выводы:

1) выявлены факторы, влияющие на оборот розничной торговли продовольственными товарами в РФ – производство сельскохозяйственной продукции, денежные расходы на питание, импорт продовольственных товаров;

2) дана оценка функции оборота розничной торговли продовольственными товарами в РФ.

Отметим, что это предварительная оценка, так как здесь мы имеем дело с временными рядами. Более точная оценка временных рядов предполагает исследование этих рядов на наличие (отсутствие) коинтеграции [9].

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The institutional structuring of the economy and value-rational activity of subjects

Abstract: The methodology of research of economic processes based on complementarity of the principles of individualism and holism is considered in article. The institutional structuring of the economy is under significant influence of its cultural value system and acts as a search for institutional compromise of interacting heterogeneous entities is shows.

Relevance and key areas of implementation of value-oriented approach in the formation of institutional practices and the solution of practical problems are justified.

Keywords: individualism, holism, economics, ethics, cultural value system, institutional system, structuring the economy, the institutional innovations.

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Институциональное структурирование экономики и ценностно-рациональная деятельность субъектов

Аннотация: В статье рассмотрена методология исследования экономических процессов, основанная на взаимодополняемости принципов индивидуализма и холизма. Показано, что институциональное структурирование экономики происходит под значимым влиянием ее культурно-ценностной системы и выступает как поиск институционального компромисса взаимодействующих разнородных субъектов. Обоснована актуальность и ключевые направления реализации ценностно-ориентированного подхода при формировании институциональных практик и решении практических задач.

Ключевые слова: индивидуализм, холизм, экономика, этика, культурно-ценностная система, институциональная система, структуризация экономики, институциональные новации.

Постановка научной проблемы и ее значение. Сложившуюся ситуацию в экономической науке многие исследователи рассматривают как кризисную, которая вызвана необходимостью пересмотра утвердившейся в рамках мейнстрима парадигмы исследования, основанной на методологическом индивидуализме, ограниченно трактуящем мотивационные и поведенческие характеристики субъектов и не позволяющим содержательно описывать взаимосвязь культуры и институционального структурирования экономики. Выход из кризиса традиционных доктрин многими исследователями видится в создании новой теории, которая может объединить экономические и культурно-ценностные компоненты, так как этико-культурные проблемы затрагивают самую суть экономических построений.

Анализ исследований проблемы. Сегодня сложились разные концептуальные подходы, которые различным образом интерпретируют связь этики и экономики [1]. Так, в рамках первого направления абсолютизируется автономность этики относительно экономики, исходя из этого возник ценностно-нейтральный подход, который характерен для доминирующей в настоящее время неоклассической школы. Сторонники второго направления видят в этике средство получения выгоды рациональным экономическим субъектом, на этику

смотрят как на долгосрочный платеж и средство снижения транзакционных издержек. Такой функциональный подход к этике присущ в основном представителям неинституциональной теории. Представители третьего направления связывают реализацию моральных принципов в сфере экономики с авторитарным путем, игнорируя автономность этики относительно экономики, на этой основе сложился морализаторский подход в экономической науке. В рамках четвертого направления влияние этических факторов рассматривается как внешнее отражение воздействия социальных факторов. Такой корректирующий подход к рассмотрению связи этики с экономикой свойствен многим социоэкономическим концепциям. Представители пятого подхода обращают внимание на нормативные основы экономической деятельности и сосредотачиваются на этическом измерении в рамках экономической науки, а также истории экономической мысли и в социально-политической структуре экономических явлений. Данное направление характеризуется критическим отношением к квазинаучной методологии экономики. Вместе с тем концептуальное ядро связанных с данным подходом предпосылок только формируется, поэтому возникает настоятельная потребность изучения содержательной специфики альтернативной мейнстримной методологии, предусматривающей корректную интеграцию культурно-ценностных факторов в экономическую теорию.

Цели и задачи статьи. Исходя из необходимости осуществления в экономической науке методологического «поворота к культуре», предполагающего разрыв с позитивизмом, господствующего в сфере познания на протяжении большей части XX в. Предложить более широкую концепцию, описывающую экономические процессы на основе взаимодополняемости методологии индивидуализма и холизма. При этом новая познавательная стратегия признана объединить в рамках общей платформы неортодоксальные направления экономических исследований (институциональную политическую экономию, социоэкономику, системную парадигму, новую экономическую социологию, теорию регуляции, теорию соглашений и др.) и ориентирована на «снижение точности» результатов исследований ради повышения их достоверности.

Изложение основного материала и обоснование полученных результатов исследования. Экономическая деятельность субъектов является средством реализации их жизненных ценностей и целей, она ориентирована на получение выгод от синергетического эффекта, возникающего при рациональ-

ном использование ресурсов в условиях общественного разделения труда и ограниченных знаний об изменениях деловой среды. Поведение субъекта экономики всегда предполагает взаимную зависимость от других субъектов, то есть оно интерсубъектно по своей природе, поскольку действия данного субъекта так или иначе влияет на поведение других субъектов и сопровождается теми или иными ответными действиями. Поэтому экономическая деятельность людей всегда основана на обоюдной оценке, просчитывании возможных действий, учете этого в ожиданиях и оценках. В связи с тем, что экономическое поведение структурно, институционально и культурно обусловлено, понятия выгоды и издержки приобретают специфический содержательный смысл. Как отмечал М. Вебер, «понятие содержательной рациональности в высшей степени многозначительно... по отношению к хозяйству применяются этические, политические, утилитарные, гедонистические, сословные, эгалитарные или какие – либо иные критерии, и с ними ценностно-рационально или содержательно рационально соизмеряют результаты хозяйствования» [2].

Выработка плюралистического, интегративного и динамического подхода предполагает анализ развития экономики как результата противоречивого культурно-ценностного взаимодействия ее субъектов и их групп в экономическом пространстве-времени вследствие сложного и многопланового процесса интерференции коррелятов. При этом важнейшими являются следующие подпространства: 1) культурно-ценностное; 2) институционально-ролевое; 3) организационно-институциональное; 4) производственно-технологическое; 5) временное, характеризующее связи настоящего с прошлым и будущим, наследственности и изменчивости и проявляющееся в наличии разнообразных ритмов эволюции и цикло-причинных связей в каждом из вышеперечисленных подпространств [3]. В зависимости от целей анализа могут быть использованы и другие измерения: внешние – экономическое, территориально-экономическое, эколого-экономическое и т.д. Экономические субъекты занимают различные позиции в многомерном экономико-временном пространстве и взаимодействуют между собой, обладая разными культурно-ценностными ориентациями, деловыми компетенциями и интеллектуальными способностями, различными властными, материальными и другими видами ресурсов.

Выделение предложенной системы координат позволяет избежать односторонности моделирования эволюции экономики процессов, абсолютизации

культурных, классовых, статусно-функциональных, организационно-институциональных, феноменологических, технократических, статистических и динамических и других версий экономической эволюции. Корректная ее интерпретация должна принимать во внимание взаимную детерминацию каждого измерения экономических процессов и структур; в результате которой складывается специфическая экономико-структурная матрица, обусловленная зависимостью экономики от пути ее развития в прошлом, и которая воспроизводится на протяжении некоторого периода времени в виде своеобразного набора структурных констант, связанных с сохранением хозяйственных традиций, стереотипов мышления и поведения. Вместе с тем их взаимная связанность не является жесткой, в реальной жизни общества могут возникнуть разные типы системных противоречий.

Предлагаемый структурно-деятельный подход, основанный на эволюционной парадигме, исходит из взаимосвязанности микро- и макроуровней и положения о том, что макрофеномены и структурные характеристики экономики являются образованиями, зависимыми от экономической деятельностью людей, имеют свой жизненный цикл и их относительную самостоятельность не следует абсолютизировать. С одной стороны, макрофеномены и макросвойства экономики выступают проявлением микроэффектов, порожденных причинно-следовательными механизмами, соединяющими решения и поведения разнородных субъектов в сложившихся контекстуальных условиях; с другой стороны, изменения типичных действиях субъектов, которые обуславливают переход экономики в некое другое состояние и появление у нее новых структурных свойств, не происходят в культурном вакууме; они осуществляются всегда в заставляемых субъектами структурных условиях, которые в свою очередь оказывают значительное влияние на экономическое поведение. Таким образом, возникающие в экономике причинно-следственные связи выражают движения как от микро- к макроуровню, так и обратное воздействие макроуровня на микроуровень.

Логика системного описания происходящих на микро- и макроуровнях взаимосвязанных процессов определяется тем, что эволюция экономических структур и ценностно-рационального поведения субъектов выражает противоречивое сочетание процессов наследственности и изменчивости. Поэтому возникает необходимость исследования связанных между собой двух групп про-

блем: во-первых, рассмотрение процесса воспроизводства макрофеноменов и макросвойств экономики как системно-сложного результата сложившихся в прошлом противоречивых взаимодействий индивидуальных и коллективных субъектов, и исходя из этого прояснение особенностей их ценностно-рационального поведения в рамках разделяемых этико-культурных представлений и существующих структурных условий; во-вторых, описание этико-культурных, институциональных и структурных изменений экономики, вызванных накоплением и генерированием знаний, новым осмыслением окружающей среды и формированием своеобразной инновационной модели поведения индивидуальных и коллективных субъектов, обусловленной наличием воспроизводимой структурообразующей матрицы, выражающей зависимость экономических перемен от прошлого пути.

Культурно-ценностная система выступает как смысло-креативное ядро экономики; она формирует вокруг себя уникальную институциональную систему, складывающуюся в результате противоречивых взаимодействий разнородных субъектов в конкретно-временных условиях, и выполняет следующие системно-регулирующие функции: 1) легитимизация и институализация норм и правил; 2) системно-компромиссная структуризация и интеграция экономики; 3) диагностика и оценка эффективности хозяйственных и институциональных установок и конструирование инновационных изменений. В связи с этим появляются соответствующие аспекты анализа процессов структурирования и эволюции экономики, характеризующие особенности взаимодействия культурно-ценностного контекста с другими ее контекстами. При этом обладающие научной ценностью подходы, предназначенные для описания отдельных аспектов экономической деятельности людей, могут быть с определенной корректировкой использованы в рамках системно-эволюционной парадигмы.

Выводы и перспективы дальнейшего исследования. Использование предложенного в статье структурно-деятельного подхода позволяет более содержательно интерпретировать системное качество экономики, своеобразие взаимодействия ее субъектов и структурных детерминант в рамках конкретно-исторического периода на основе введения в исследование явным образом наиболее методологически сложного аспекта – этико-культурного фактора, выступающего не только фундаментальным основанием, но и стратегически зна-

чимым ориентиром, формирующем сквозные принципы организации национальной экономики и хозяйственных процессов, а также их реструктурирования.

Работа подготовлена при поддержке РГНФ (заявка № 16-12-55015).

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Head high school administrative competence: current issues

Abstract: This article deals with the definition of requirements for modern leaders of higher education institutions, including through the definition of their management competence system. The author identifies the problems of the current state of professional competence of university executives, analyzed research on the managerial qualities of a modern leader of the institution, the ways to improve them through a system of post-graduate training and self-education.

Keywords: university supervisor, management activity, management of universities, professional competence, the quality of the university supervisor.

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Управлінська компетентність керівника ВНЗ: актуальні аспекти

Анотація: Дана стаття присвячена визначенню вимог до сучасних керівників ВНЗ, зокрема через визначення системи їх управлінської компетентності. Автором визначені проблеми сучасного стану професійної компетентності керівників ВНЗ, проведено аналіз наукових досліджень щодо управлінських якостей сучасного керівника навчального закладу, визначені шляхи їх вдосконалення через систему післядипломної підготовки та самоосвіти.

Ключові слова: керівник ВНЗ, управлінська діяльність, управління ВНЗ, професійна компетентність, якості керівника ВНЗ.

Актуальність. Система освіти усе більше набуває рис комерціалізації, тому й методи менеджменту організацій все більше входять у систему освіти та потребують від керівників навчальних закладів ширшої компетентності. Саме від рівня професійної управлінської компетентності керівника навчального закладу залежить виконання ВНЗ соціальної місії щодо розвитку свідомості суспільства, інноваційного розвитку молоді, інтелектуального та професійного становлення педагогічного складу. Таким чином, сьогодні постає важливість процесу професіоналізації сфери управління освітою та особливо виховання та навчання сучасних керівників навчальних закладів.

Мета статті полягає в теоретичному обґрунтуванні, осмисленні структури та змісту управлінських якостей та професійної компетентності керівника ВНЗ.

Аналіз останніх досліджень і публікацій свідчить про увагу вчених до проблеми професійного становлення та розвитку професійної компетентності керівників закладів освіти, зокрема, досліджувалися теоретико-методичні засади професійного становлення і зростання керівників навчальних закладів: Г. Єльнікова [3], Т. Сорочан [6], А. Хуторський [8], А. Чміль [9] та ін., проте, зазначимо, що на сьогодні проблематика професіоналізації управлінської діяльності у сфері освіти залишається досі актуальною.

Виклад основного матеріалу. Управління – комплексна узагальнена характеристика управлінської праці, що відображає її якісні ознаки й особливості. Культура управління включає сукупність знань, їх структуру, світогляд, морально-етичні норми роботи, ставлення до праці, навички в організації роботи тощо. Саме тому до сучасного керівника навчального закладу висувається чимало вимог.

Характеризуючи якості керівника як комплекс взаємопов'язаних блоків, В. Шепель виокремлює: загальні якості (інтелект, фундаментальні знання, достатній досвід управлінської діяльності); конкретні якості (ідейно-етичні, науково-професійні; організаційні, психофізичні); специфічні особистісно-ділові якості [10].

Розглядаючи якості та риси керівника, який досягає успіху, Є. Ходаківський, Ю. Богоявленська, Т. Грабар [7] поділяють їх на наступні:

1. Психологічні риси: прагнення до лідерства, здатність до керівництва; сильні вольові якості; готовність до розумного ризику; прагнення успіху, честолюбство; здатність брати на себе відповідальність в екстремальних ситуаціях; самодостатність особистості; комбінаторно-прогностичний тип мислення; уміння протистояти стресу; адаптивність, тобто швидко пристосовуваність до нових умов.

2. Інтелектуальні риси: прагнення до постійного самовдосконалення; схильність до сприйняття нових ідей та досягнень, здатність відрізнити їх від ілюзорних; панорамність мислення, професійна предметність (знання деталей та тонкощів управління); мистецтво швидко опрацьовувати, ранжувати інформацію і на цій основі приймати рішення; здатність до самоаналізу; уміння розуміти, приймати та використовувати з користю для справи думки, протилежні власним.

3. Професійні риси: уміння ефективно використовувати кращі досягнення науково-технічного прогресу, інформаційних технологій; глибокі знання особливостей функціонування ринкової економіки; здатність віднаходити резерви; уміння заохочувати працівників до діяльності, справедливо критикувати; володіння мистецтвом приймати нестандартні управлінські рішення за тих умов, коли альтернативні варіанти дій, інформація та цілі не чіткі або сумнівні; уміння ефективно та раціонально розподіляти завдання і відводити на них оптимальний час; діловитість, постійний вияв ініціативи, підприємливість.

4. Соціальні риси: уміння враховувати політичні наслідки рішень; схильність керуватися принципами соціальної справедливості; уміння встановлювати та підтримувати систему стосунків із рівними собі людьми; тактовність та ввічливість, переважання демократичності в стосунках із людьми; уміння брати на себе відповідальність; беззастережне виконання правил, які схвалені організацією; уміння заохочувати персонал до відвертості й групових дискусій.

Проаналізувавши погляди науковців, та враховуючи сучасні тенденції розвитку компетентнісного підходу, вважаємо, що класифікація організаційно-управлінських якостей керівників вищого навчального закладу повинна виглядати наступним чином:

1. Професійна компетентність. До неї можна віднести наявність професійних знань і умінь у сфері управління вищим навчальним закладом, знання робо-

ти на посаді ректора (проректора, декана, завідувача кафедри), досвід керівництва і участі в науковій, педагогічній та громадській діяльності.

2. Ділова компетентність. До ділових якостей керівників ВНЗ доцільно віднести вміння приймати стратегічні рішення, підприємливість (тактика дій) і особисту організованість.

3. Організаторські компетентності. Під ними розуміються взаємини з людьми: прагнення до лідерства; вміння будувати відносини з управлінським персоналом, викладачами, співробітниками, аспірантами та студентами, органами управління, роботодавцями та ЗМІ, підбирати кадри; особистий авторитет в суспільстві і в ВНЗ.

4. Моральна компетентність - духовні якості, культура поведінки в суспільстві, із співробітниками, показ прикладу поведінки студентству, тощо.

5. Політична компетентність. До неї відноситься розуміння інтересів держави, ВНЗ (факультету, кафедри), особистості педагога, аспіранта і студента, вміння рахуватися з різними точками зору.

6. Працездатність. Це якість характеризується здатністю до тривалої, творчої та продуктивної діяльності на керівній посаді.

7. Наукова компетентність: наявність у керівника навчального закладу знань у відповідних сферах науки, досвід самостійної науково-дослідницької праці.

8. Педагогічна компетентність: наявність педагогічних знань і вмінь, досвід педагогічної діяльності в навчальному закладі.

9. Правова компетентність: знання господарського, трудового та інших видів законів, нормативно-правових засад функціонування та розвитку системи освіти, досвід і вміння використовувати ці знання в умовах навчального закладу.

У цьому переліку центральним компонентом вважаємо управлінську компетентність.

А. Хуторський дав таке визначення управлінської компетентності керівника установ професійної освіти: «Це сукупність особистісних якостей керівника, де розкривається зміст цієї властивості особистості з позиції сучасної управлінської, педагогічної діяльності керівника освітнього закладу» [8, с. 5]. Тобто майстерність управління полягає в умінні обирати найбільш ефективні методи управління для конкретного моменту часу й обставин, що склалися в управлінській діяльності. Управлінська компетентність керівника освітньої

установи – це готовність і здатність керівника освітньої установи виокремлювати, точно формулювати, цілісно й глибоко аналізувати проблеми навчального закладу та знаходити з великої кількості альтернативних підходів до їх вирішення найбільш доцільний і ефективний щодо конкретної ситуації установи професійної освіти. К. Корсак пропонує визначати вісім груп компетентностей, а саме: культура діалогу, екологічна культура, культура повсякденного побуту, демократична культура, правова культура, організаційна (корпоративна) культура, технологічна культура, ринкова культура.

Т. Сорочан визначає професіоналізм управлінської діяльності керівника навчального закладу як сукупність компетенцій, які формуються й дають суб'єкту (керівнику) змогу професійно виконувати управлінську діяльність у сучасних соціально-економічних умовах з урахуванням особливостей об'єкта управління, пов'язаних із вирішенням педагогічних завдань [6, с. 156].

Отже, підвищення професіоналізму управлінської компетентності керівника вищого навчального закладу в сучасних умовах стає важливою умовою успішності інноваційних процесів в освіті й має відбуватися в галузі освітнього менеджменту. Тому важливим завданням у системі післядипломної педагогічної освіти є використання інноваційних технологій у процесі підготовки керівників навчальних закладів. Адже, формування у керівника компетентностей ефективного управління навчальним закладом в сучасних умовах неможливе без спеціального навчання з менеджменту освіти.

Наголосимо, що значну роль у роботі будь-якого керівника відіграє самопідготовка та самоосвіта. Тому кожен керівник повинен сам знаходити шляхи ефективної роботи та її удосконалення для підвищення своєї компетентності.

Висновки та перспективи подальших досліджень. Розвиток управлінської компетентності керівника освітньої установи передбачає необхідність наявності у нього сформованого системного мислення, навичок взаємодії з зовнішнім середовищем, розвитку навчального закладу та його структурної розбудови, зорієнтованої на вивчення й урахування запитів і потреб особистості, закладу, освіти регіону, а також навичок з технологій управління якістю.

Управлінська компетентність керівника освітньої установи – це готовність і здатність керівника освітньої установи виокремлювати, точно формулювати, ці-

лісно й глибоко аналізувати проблеми навчального закладу та знаходити з великої кількості альтернативних підходів до їх вирішення найбільш доцільний і ефективний щодо конкретної ситуації установи професійної освіти.

Керівник навчального закладу повинен володіти навичками нового мислення, пов'язаного з проникненням менеджменту в управлінську діяльність керівників закладів освіти. Першочергове значення має формування внутрішньої культури: бачення місії свого навчального закладу, усвідомлення цілей, створення системи цінностей, що має соціальне значення, забезпечення високої вмотивованості управлінських дій тощо. Для цього кожен керівник вищого навчального закладу насамперед повинен мати відповідну управлінську освіту, яка може бути розвинута й поглиблена в системі післядипломної педагогічної освіти.

Аналіз і висновки, що здійснені в ході дослідження, не вичерпують всіх аспектів проблеми, яка розглядається. А тому перспективи подальших розвідок у даному напрямі вбачаємо у розробленні вимог до управлінської компетентності керівників ВНЗ, вдосконалення їх формування та виокремлення критеріїв їх оцінки.

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Pervoaprelskaya shutka or bet with minister

Abstract: Investigation were held with aim of the removal from deadlock of the milk branch and security of the food safety by given position. The paper is devoted to algoritms of the creation of the million milk herd and perfection of the intersectoral exchange on market of the milk.

Keywords: import substitution, milk branch, state support.

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Первоапрельская шутка или пари с министром

ЗООТЕХНИК. Послушай, что ты думаешь о снах? Ты можешь их растолковать?

АВТОР. Ну, как сказать. Давно известно, что Д.И. Менделеев свою таблицу открыл во сне, авиаконструктор Антонов хвостовое оперение Ан-22 Антей увидел тоже во сне, формулу инсулина изобрели в Канаде таким же образом. Но зачем тебе это?

ЗООТЕХНИК. Понимаешь, я разговаривал с министром во сне. И что бы это значило?

АВТОР. Я думаю, что это к повышению в должности.

ЗООТЕХНИК. А почему ты так думаешь?

АВТОР. Из собственного опыта. Когда-то мне приснился И.В. Сталин, и через некоторое время меня избрали председателем профкома академии, в другой раз приснился О.И. Бетин (губернатор), и я стал деканом факультета. В последний раз мне приснился В.В. Путин, и меня назначили директором института. Так что готовь дичь... Но о чем вы разговаривали, интересно?

ЗООТЕХНИК. Мы говорили о развитии молочной отрасли. И хочу, чтобы ты записал мой сон, как ты умеешь, пока я помню все детали.

АВТОР. Ты что, сам писать разучился или руки дрожат?

ЗООТЕХНИК. Ты же знаешь, Пушкин А.С. подарил сюжет о ревизоре своему другу Н.В. Гоголю, а я дарю свой сон тебе, в надежде на то, что ты сделаешь из него либретто, то есть шедевр, понимаешь? Согласись!

АВТОР. Так, ты еще не проснулся, как я погляжу.

ЗООТЕХНИК. Да проснулся я, сегодня второе апреля, а это было вчера. Начни записывать, пока не забыл.

АВТОР. Ну, рассказывай.

ЗООТЕХНИК. Конечно... Добрый день, господин министр!

МИНИСТР. Здравствуйте. Кто Вы?

ЗООТЕХНИК. Я зоотехник, экономист и организатор сельскохозяйственного производства. Господин министр, сегодня пятница первое апреля, и может быть, Вы дадите мне отворот-поворот? Не обижусь.

МИНИСТР. Нет уж, раз Вы вышли на меня, то, как говорил Штирлиц, валяйте.

ЗООТЕХНИК. Я изучаю проблемы устойчивого и эффективного развития скотоводства.

МИНИСТР. Как ни странно, но я - тоже. Наше село добилось определенных успехов в импортозамещении в птицеводстве и свиноводстве, однако молочная отрасль остается слабым местом. Поэтому ведомство, которое я представляю, разработало программу развития данной отрасли до 2020 года. Программа преследует увеличение численности коров на 1 млн. голов, получение дополнительно 5 млн. т молока в год, доведение валового производства до 36 млн. т и обеспечение потребности нашего населения на уровне 85-90%. Необходимые финансовые средства будут выделены [2].

ЗООТЕХНИК. Где Вы намерены купить коров?

МИНИСТР. В настоящее время в личных подсобных хозяйствах содержится 4 млн. коров. Вот, здесь и купим.

ЗООТЕХНИК. У вас, господин министр, есть задачи и есть ответы. Только, как говорил Аристотель, вопрос в том, правильно ли составлены задачи и верные ли даны на них ответы [1]. Можно согласиться с тем, что задачи составлены правильно, а ответы - неубедительны.

МИНИСТР. Что не так?

ЗООТЕХНИК. С моей точки зрения вы не выполните заявленную программу.

МИНИСТР. А я утверждаю, что программа будет выполнена, поскольку на ее реализацию будет выделяться 11 млрд. руб. Я очень люблю знаменитые осетинские пироги с сыром, но мне не нравится Ваш пессимизм. Или Вам не нравятся пироги, или Вы не знаете цену молока.

ЗООТЕХНИК. Молоко является одним из важнейших продуктов питания, рост производства которого, как отмечал В.И. Ленин, «свидетельствует о повышении благосостояния и улучшения условий питания населения» [3]. От себя же добавлю: никакое море нефти не стоит кружки молока. Но не в этом дело, Вы меня не убедили, или Вы не все говорите. Поэтому я предлагаю Вам заключить пари. Если Вам удастся успешно реализовать программу, я подарю Вам барана эдильбаевской породы, а если провалится, как и предыдущая, то Вы - мне. Согласны?

МИНИСТР. Я согласен, но при одном условии. Вы называете причины, из-за которых программа не может быть выполнена. Хочу особо подчеркнуть, в настоящее время в нашей стране есть понимание и политическая воля на всемерную поддержку сельского хозяйства и поэтому буду признателен за разумные, позитивные и эффективные предложения для достижения главной цели - напоить страну молоком.

ЗООТЕХНИК. Мне бы не хотелось преувеличивать свои скромные познания проблемы, тем более, что, по вашему мнению, ваши коллеги являются весьма высококвалифицированными специалистами. Однако... несколько десятков лет тому назад выпускник агрономического факультета Самсонов со сцены актового зала произнес: «В позапрошлом году мы посеяли 200 га сахарной свеклы, все посева поела тля, в прошлом году мы увеличили посева культуры до 400 га, все всходы поела тля, в этом году посеяли 600 га, чтобы она подавилась...»

МИНИСТР. Вы хотите провести аналогию?

ЗООТЕХНИК. Да, господин министр. Исследования показывают, что с 2000 г. государство вкладывает все больше и больше средств в молочную отрасль, а валовое производство молока застряло между рецессией и

стагнацией на уровне 30 млн. т. Видно, что отрасль не реагирует на заботу государства. Должны же быть какие-то причины и объяснения этому факту.

МИНИСТР. Продолжайте, пожалуйста.

ЗООТЕХНИК. Основные причины, с моей точки зрения, заключаются в том, что молочное скотоводство функционирует в системе сплошной диспропорции и диспаритета. При этом основная диспропорция выражается в низкой плотности скота. Так, на 17,5 человек приходится 1 корова, которая при продуктивности в 5000 кг может дать на 1 человека 285 кг молока, когда этот показатель в два-семь раз выше соответственно во Франции, США, Новой Зеландии и Ирландии, Белорусии. Или я не прав?

МИНИСТР. Мы должны и будем уделять повышенное внимание молочной отрасли в ЛПХ, потому что: несмотря на увеличение валовых надоев в сельскохозяйственных организациях на 2% и фермерских хозяйствах на 5%, из-за сокращения производства в ЛПХ на 3% отрасль стоит на месте [2].

ЗООТЕХНИК. Но, позвольте, если в ЛПХ так неважны дела, то после изъятия или выкупа 1 млн. коров здесь совсем станет плохо. Или Вы предлагаете покупать не коров, а нетелей? В таком случае, для получения 1 млн. коров требуется 1,2 млн. нетелей или 1,4 млн. телок старше 1 года. При том, что в среднем численность коров ежегодно сокращается на 100 тыс. голов.

МИНИСТР. Для того, чтобы переломить ситуацию в отрасли, необходимы надежные механизмы. Участие государства должно быть комплексным: это и субсидии для привлечения инвестиций, и гранты фермерам, и регулирование рынка для формирования приемлемой цены, и поддержка сбыта [6]. Кроме того, мы хотим и добьемся увеличения с 20% до 35% объема возмещения издержек на модернизацию существующих и строительства новых молочных ферм и комплексов, а также направления средств на массовое повышение качества скота в ЛПХ с последующим выкупом коров за счет средств федерального бюджета [2]. Согласитесь, это - стимул, это - перспектива.

ЗООТЕХНИК. Следует заметить, что в ЛПХ в массовом порядке не будут продавать телок до 1 года и нетелей по известным соображениям, а годовалых и старше 1 года - будут.

МИНИСТР. Мы будем платить достойную цену, необходимо покупать телок любой возрастной группы.

ЗООТЕХНИК. Покупка телок старше 1 года позволит создать качественное стандартизированное миллионное молочное стадо желательной породы. И так, на начало 2016 года 1 кг живой массы телок молочных пород стоил 155-170 руб., следовательно, 1 телка старше 1 года обойдется в 56 тыс. руб. А достойную цену можно было обозначить 70 тыс. рублями. Я считаю, господин министр, если бы вам удалось выкупить в 2016 г. в ЛПХ хотя бы 700 тыс. телок старше 1 года и столько же в 2017 г., то я бы сказал: вы большой молодец, господин министр. Потому что это реальный алгоритм создания миллионного полноценного молочного стада к 2020 г.

МИНИСТР. Мне поручено дело, и оно будет выполнено. Пожалуйста, продолжайте.

ЗООТЕХНИК. Однако актуальным остается вопрос о месте содержания выкупленного скота. Конечно, можно было использовать механизм так называемого материнского капитала с оставлением выкупленных телок в ЛПХ, или построить новые молочные фермы и комплексы с учетом близости потребителей молока, или разместить выкупленный молодняк на фермах и комплексах сельскохозяйственных организаций, которые еще сохранились, но требуют определенной модернизации. Предпочтение следовало бы отдать последнему варианту, поскольку здесь имеются некоторая инфраструктура, кадры, традиции, и он обойдется дешевле. Хотя, в любом случае, придется проблему согласовывать с регионами.

МИНИСТР. Продолжайте, я Вас слушаю.

ЗООТЕХНИК. Ваша пресс-служба сообщила, что в 2016 г. молочная отрасль получит из федерального бюджета 25 млрд. руб. Это бы точно позволило увеличить молочное стадо на 1 млн. коров, построить новые или модернизировать существующие фермы и комплексы, вести массовое повышение генетического потенциала скота, совершенствовать кормовую базу и т.д. Однако это еще не бизнес. Что дальше?

МИНИСТР. Вы правы, это еще не бизнес. Он появляется в процессе обмена. Хочу еще раз подчеркнуть: бизнес не придет в молочную отрасль, если не получит отдачи. Наша задача - выстроить долговременную программу развития, совместно с инвесторами обговорить правила игры..., регулирование рынка для формирования приемлемой для производителей цены, повышение рентабельности, поддержка сбыта молочной продукции [7].

ЗООТЕХНИК. Я, господин министр, по своей наивности полагал, что если у вас в руках 25 млн. государственных рублей, то согласование правил игры, прежде всего, цены и ценовых соотношений, следовало бы вести с сельскохозяйственными товаропроизводителями, переработчиками и продавцами молочной продукции.

МИНИСТР. Мы так и делаем. Но мы хотим привлечь в отрасль частных инвесторов, что очень важно.

ЗООТЕХНИК. Использование договорных цен-это отход от рыночных принципов, чему я очень рад, потому что никакой пользы, кроме вреда, рыночная экономика пока не принесла отрасли. Однако опыт показывает, что при выработке так называемых приемлемых цен на молоко почему-то более ущербным оказывается село. Так происходит в РФ и во многих странах.

МИНИСТР. У вас есть предложения?

ЗООТЕХНИК. Да, господин министр. Анализ показывает, что в 2015-2016 гг. формирование цены на нефть происходило, все знают об этом, не по принципам рыночной экономики, не в условиях дисбаланса спроса и предложения, не по невидимой руке А. Смита, а по видимой, которая играет «вежливую» роль экономических санкций. Из этого факта вытекает вывод о том, что мировой экономикой управляет не рынок, а отдельные люди и государства, и нашей стране необходимо шире использовать принципы плановой экономики, если мы хотим жить без экономических кризисов. Согласитесь, господин министр, план лучше, чем кто кого обманет. Совершенно очевидно, что у нас ценообразование монополистическое. От жульнического цено-образования страдает молочная отрасль мира, поскольку в нем всегда участвует спекулятивная доля.

В настоящее время сельхозтоваропроизводителей в розничной цене продукта не превышает 30%, а закупочная цена 1 кг молока составляет менее 20 рублей. Поэтому я предлагаю устанавливать твердые ценовые соотношения хозяйствующих субъектов рынка молока в розничной цене товара в соответствии с их издержками производства: сельскохозяйственные товаропроизводители — 50%, переработчики - 30%, продавцы - 20%. Данные ценовые соотношения законодательно закрепить на 2016-2020 гг., что позволит вместе с мерами господдержки отрасли ясно видеть свои перспективы, принимать меры к сокращению издержек производства и повысить уровень рентабельности на каж-

дом участке. При этом мировое село почувствует справедливое отношение к себе и прочность своих перспектив развития на длительный период. На следующую пятилетку разработать и утвердить новые ценовые соотношения. Заметьте, господин министр, данное предложение не требует для реализации ни одной копейки. Давайте попробуем, посмотрим.

МИНИСТР. Посмотрим. Продолжайте, пожалуйста.

ЗООТЕХНИК. По валовому производству молока наша страна занимает шестое место в мире, средний россиянин потребляет в год примерно столько молока, сколько француз, белорус, англичанин, итальянец. Даже американцы едят чуть больше нас при том, что США являются лидерами по производству молока [4]. Но никто не кричит: «Караул, молока не хватает!»

Поэтому возникает вопрос: все-таки, какую цель преследует ваше ведомство при реализации данной программы? Или обеспечить продовольственную безопасность населения по данной позиции, или повысить занятость сельского населения, или получение прибыли?

МИНИСТР. И первое, и второе, и третье, и четвертое, и пятое.

ЗООТЕХНИК. А что означает четвертое и пятое?

МИНИСТР. Четвертое означает то, что от 1 млн. коров получим около 500 тыс. бычков, которые будут выращены на мясо, а пятое - это 8 млн. т органических удобрений, не считая навоза от шлейфа. Но почему спросили о цели программы? Что тут неясно?

ЗООТЕХНИК. Как сказал классик, я скажу вам одну вещь, только вы не обижайтесь. Исследования свидетельствуют: нам молока не хватает не потому, что мало производим, а потому, что мяса не хватает. Согласитесь, господин министр, если наешься мяса, о молоке не скоро вспомнишь.

МИНИСТР. В настоящее время РФ по производству мяса занимает пятое место в мире, на 1 человека приходится более 70 кг [5]. Это солидные показатели.

ЗООТЕХНИК. А в США, Австралии, Франции и некоторых других странах едят больше мяса и меньше молока.

МИНИСТР. Ваш взгляд на проблему ясен. При том, что молочная отрасль длительный период топчется на месте, а мясная развивается, обеспечивая 4-х процентные ежегодные приросты. Мы и дальше будем уделять внимание мясному животноводству, но прежде мы должны навалиться всей страной на моло-

ко, потому что оно является не только незаменимым, но и самым доступным продуктом для большинства наших граждан.

ЗООТЕХНИК. Господин министр, большое Вам спасибо за то, что Вы выслушали меня. Буду очень рад, если министр запомнит какое-либо из прозвучавших здесь предложений. Но я буду больше рад Вашему выигрышу, чем собственному.

МИНИСТР. Спасибо. Как говорят на Кавказе, будем посмотреть.

ЗООТЕХНИК. Ну, как? Сделаешь заключение?

АВТОР. Актуальность и научная новизна заключается в том, что в условиях санкций важнейшим источником увеличения численности молочного стада РФ с 8,3 млн. коров в 2015 г. до 9,3-9,5 млн. голов являются ЛПХ. Выкуп у ЛПХ 1,4 млн. телок старше 1 года по цене 200 руб. за 1 кг живой массы и их осеменение семенем быков молочных пород позволят сформировать самостоятельные молочные фермы и комплексы с численностью более 6 тыс. рабочих мест на селе, повысить молочную продуктивность коров на основе повышения генетического потенциала животных, создания эффективной кормовой базы, повысить производительность труда, увеличить уровень товарности молока, совершенствовать учет продукции и таким образом повысить технологическую эффективность отрасли.

Однако следует не забывать, что численность молочного стада в стране в предыдущие годы составляла и 10, и 11, и 12 млн. голов, но валовое производство молока все время сокращалось. Поэтому для того, чтобы современный повышенный оптимизм министра не подорвать, требуются радикальные меры в системе ценообразования в молочной отрасли. Предлагаемые твердые ценовые соотношения на ряд лет могут служить сигналом к повышению экономической эффективности и наращиванию объемов производства молока. Такой сигнал нужен и ЛПХ, и КФХ, и сельхозорганизациям как России, так и других стран. Он скажет о том, что власть услышала сельскохозяйственных товаропроизводителей.

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***Methodological approaches to development
of integrated water resources management
of the Kuyalnik estuary***

Abstract: Methodical economic and ecological approaches create a system of integrated management of water resources in the basin of the Dry Estuary. The evaluation of the individual components of the balance of the pond water-heatin.

Keywords: water resources, integrated management, Kuyalnik estuary.

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***Методологические подходы к разработке системы
интегрированного управления водными ресурсами
Куяльницкого лимана***

Аннотация: Рассмотрены методические экономико-экологические подходы создания системы интегрированного управления водными ресурсами в бассейне Куяльницкого лимана. Проведена оценка отдельных составляющих водного баланса водоема.

Ключевые слова: водные ресурсы, интегрированное управление, Куяльницкий лиман.

В процессе развития современной цивилизации человечество пришло к пониманию – вода как один из важнейших элементов окружающей среды тре-

бует всеобъемлющего интеграционного управления с учетом всех видов и категорий водных ресурсов Земли, всех категорий водопользователей и последствий их антропогенного влияния на состояние природных вод. Особое значение в концепции интегрированного подхода к управлению водными ресурсами территорий приобретает оценка последствий антропогенного влияния с точки зрения определения дальнейшего существования, устойчивого и эффективного развития водных ресурсов. По данным [14, с. 3] сегодня на каждого жителя Земли в год приходится до 750 м³ доступной к использованию пресной воды. По прогнозам ЮНЕСКО к 2050 году, без учета прогнозируемых климатических изменений, данный показатель может уменьшиться в среднем до 450 м³, что по классификации ООН [15, с. 5] означает переход более 80% стран мира за границы водного дефицита.

Интегрированное управление водными ресурсами можно охарактеризовать как процесс перманентной оценки водохозяйственного баланса территории с определением постоянных тенденций его изменений в зависимости от влияния многосвязных факторов: характера и количественных показателей хозяйственной нагрузки, как на водный объект, так и на водосборный бассейн в целом, прогнозируемых в будущем климатических изменений и их влияния на характеристики водных ресурсов исследуемой территории и др. Определение факторов влияния и тенденций изменений водохозяйственного баланса обуславливает необходимость последующей разработки планов интегрированного управления водохозяйственной деятельностью, первоочередной задачей которых должна быть увязка существующего водно-ресурсного потенциала с требованиями хозяйственного комплекса территории или водного бассейна.

Необходимо подчеркнуть, что качество воды является неотъемлемой составной частью водно-ресурсного потенциала какой-либо территории или бассейна, поэтому во время разработки планов интегрированного управления особое внимание должно уделяться экологическим аспектам оценки качества вод, определения отдельных водопользователей как загрязнителей водного бассейна.

Первоосновой разработки схем интегрированного управления водными ресурсами бассейна – общий учет всех составляющих естественного и искусственного восстановления объемов водных ресурсов в границах определенных территорий, что дает возможность составления текущего водохозяйственного

баланса, разработки схем рационального пространственного и временного распределения ресурса, а также контроля допустимых норм антропогенной нагрузки на водно-ресурсный потенциал бассейна. Кроме того, разработка интегрированного управления водными ресурсами бассейна одновременно с выше указанными задачами в обязательном порядке должна рассматривать вопросы финансово-экономического блока, связанными с платным водопользованием.

При этом необходимо четко отличать два экономических понятия – стоимость и оплата. Стоимость воды имеет особое значение для рационального использования ресурса в случае отсутствия возможностей полного обеспечения потребностей водопользователей при отраслевом или территориальном распределении. В первую очередь, данный факт важен во время разработки схем альтернативного использования ресурса как регулирующего инструмента экономического блока интегрированного управления водными ресурсами. Плата за воду используется как экономический инструмент для поддержки уязвимых групп водопользователей, влияя на их поведение в разрезе экономии и эффективного использования природного ресурса, обеспечивая стимулирование в управлении спросом, окупаемости предоставляемых услуг и готовности отдельных потребителей оплачивать за дополнительные водохозяйственные услуги [10, с. 57].

Признание водного ресурса в качестве экономического товара – весьма эффективное средство в принятии решений по распределению ресурса между отдельными секторами хозяйственного комплекса или отраслями экономики, а также между разными водопользователями в границах одного сектора или отрасли. Указанное имеет особое значение в случаях, когда дальнейшее увеличение объемов потребления ресурса фактически невозможно.

Лиманы Северо-Западного Причерноморья представляют уникальные природные системы, которые являются важной составной частью водного фонда страны и имеют важнейшее природное, рекреационное и социально-экономическое значение для Украины.

Всего на участке побережья северо-западной части Черного моря в междуречье Дуная и Днестра расположены 21 лиман, которые по типу водного питания подразделяются на две большие группы [5, с. 12]:

1 группа – открытые лиманы, которые имеют достаточно свободный водообмен с морем. В свою очередь к данной группе лиманов могут быть отнесены:

- открытые лиманы с относительно большим притоком речных вод (Днепровский, Днепро-Бугский и др.);
- открытые лиманы с незначительными показателями речного притока (Березанский);
- искусственно открытые лиманы с незначительными показателями поверхностного притока (Малый Аджалыкский, Сухой и др.).

2 группа – закрытый тип лиманов, который наиболее распространен на территории Причерноморья. Данные водные объекты образовались в процессе затопления устьевых участков рек вследствие общих геологических процессов трансгрессии побережья Северного Причерноморья, а также за счет подъема уровня Черного моря [1, с. 55]. Водный режим данного типа водоемов формируется за счет речного притока и притока подземных вод, а также за счет поверхностного притока от атмосферных осадков.

В целом регион Северо-Западного Причерноморья и его водные объекты играют особую роль в развитии хозяйственного комплекса Украины. В первую очередь, необходимо отметить тот факт, что на данной территории расположены наибольшие морские и речные порты Украины, которые ежегодно обеспечивают перевалку практически 90% грузопотоков страны; через северо-западную часть Украинского Причерноморья проходят маршруты международных транспортных коридоров №7 и №8, что также значительно повышает роль региона в устойчивом развитии экономики страны. Однако в тоже время данные обстоятельства обуславливают огромные антропогенные нагрузки на природные комплексы региона.

Реализация европейских программ международных транспортных коридоров и постоянное увеличение потоков международного транзита природных ресурсов позволяют рассматривать Азово-Черноморский бассейн как особую транспортную зону, которая связывает прилегающие страны с Европой. Необходимо также отметить существенное усиление геоэкономической заинтересованности многих государств к Азово-Черноморскому региону в связи со стратегическим курсом Европейского Союза на формирование единой европейской транспортной системы.

Куяльницкий лиман – водоем, расположенный в 8,5 км северо-западнее г. Одессы, который по всем показателям может быть отнесен ко 2-й группе лиманов закрытого типа с относительно небольшим влиянием на гидрологический режим таких характеристик как речной приток и атмосферные осадки [8, с. 672].

Общая площадь водосбора Куяльницкого лимана составляет 2250 км², основным источником поступления речного притока является река Большой Куяльник, площадь водосбора которой при длине реки в 170 км составляет 1860 км² (82,7% общей водосборной площади лимана). Характерной особенностью Куяльницкого лимана является значительная зависимость его морфометрических характеристик от степени наполнения водоема. Так по данным [3, с. 41] длина лимана в августе 2011 г. составляла всего 20,7 км при увеличении данного показателя для более многоводных периодов года до 28-29 км. Площадь водного зеркала поверхности лимана в зависимости от степени наполнения водоема может изменяться от 19 до 74 км², ширина лимана постепенно увеличивается с севера на юг и достигает максимального значения 3,6 км, средняя глубина составляет 0,4 м, при максимальных ее значениях в устье реки Кубанка до 1,8-2,0 м. [3, с. 45]. Объемы наполнения Куяльницкого лимана могут достигать 370 млн. м³, однако в последние годы (2009-2012) они составляли не более 18,8-20,0 млн. м³. Характерной особенностью Куяльницкого лимана также является интенсивное заиление чаши водоема. Так, за период с 1975 г. по 2009 г. объем лимана за счет заиления в области минимальных уровней воды уменьшился на 13,0 млн. м³, т.е. средняя интенсивность уменьшения объема лимана за последние три десятилетия составила 0,38 млн. м³ в год.

Куяльницкий лиман широко известен как значимый рекреационный и бальнеологический объект государственного и мирового значения. Высокие лечебные свойства имеют грязи и рапа лимана.

Построение схемы интегрированного управления водными ресурсами бассейна основывается на ряде ключевых принципов, которые определяют их сущность [13]. В первую очередь, необходим анализ действующей нормативно-правовой базы, которая может явиться основой дальнейшего развития исследуемой территории. Необходимо отметить, что кроме базисных законов государства, таких как Земельный и Водный кодексы Украины, Законы Украины «Про курорты», «Про охрану окружающей природной среды» и др., в разные

периоды были приняты и действуют в настоящее время специальные акты, которые приурочены к использованию и охране курортно-оздоровительных и рекреационных территорий Одесской области. К числу таких нормативно-правовых документов можно отнести: постановление Совета Министров Украинской ССР «Про границы округа и зон санитарной охраны курорта Куяльник в Одесской области № 102 от 7 марта 1985 г., постановление Кабинета Министров Украины «Про мероприятия по улучшению работы по использованию и охране территорий курортно-оздоровительного и рекреационного назначения в Одесской области» № 1900 от 10 декабря 2003 г., Региональная программа сохранения и восстановления водных ресурсов в бассейне Куяльницкого лимана на 2012-2016 годы, утвержденная решением Одесского областного совета от 28 октября 2011 г. № 270-УІ и др.

С учетом особенностей территории, которая исследуется, специфики развития его социально-хозяйственного комплекса, рекреационного значения водного объекта, одним из основных сценариев комплексного развития водного бассейна Куяльницкого лимана должна быть:

- разработка региональной стратегии обеспечения сохранности и устойчивого развития экосистемы территории;
- совершенствование системы управления территорией бассейна Куяльницкого лимана, которая должна быть отнесена к территориям ограниченного статуса использования на национальном уровне;
- усовершенствование и усиление законодательно-нормативной и регуляторной базы, реализация всего комплекса мероприятий, предусмотренных действующими нормативно-правовыми актами;
- максимальное привлечение национальных и международных инвестиционных проектов в обеспечении процесса сохранения и восстановления территориальных комплексов природно-рекреационного и заповедного фонда в бассейне Куяльницкого лимана.

Схема интегрированного управления водными ресурсами Куяльницкого лимана, на наш взгляд, должна опираться и учитывать следующие требования:

1. Интегрированное управление должно осуществляться по «бассейновому принципу», в пределах гидрографических границ в соответствии с морфологией бассейна без выделения в отдельные зоны каких-либо составляющих территории независимо от их географического расположения в пределах ис-

следуемой территории, ландшафта, особенностей современного хозяйственного освоения, наличия гидротехнических сооружений и др. [9, с. 104; 11, с. 23; 13].

Схема интегрированного управления должна учитывать полный комплекс факторов составляющих уравнения водного баланса территории (возможный водообмен с морской акваторией, приток речных и поверхностных вод, атмосферных осадков, грунтового притока, показателями испарения, сбросных и сточных вод).

Бассейн Куяльницкого лимана должен быть разделен на морфологически однородные участки, которые имеют приблизительно одинаковые количественные показатели влияния отдельных составляющих водного баланса. Для каждого из участков бассейна с учетом их особенностей формирования водного баланса разрабатывается оценка водно-ресурсного потенциала, которые в окончательном виде увязываются в единую для всего бассейна схему.

2. Увязка всех видов водопользования в границах бассейна Куяльницкого лимана и для всех объектов хозяйственной деятельности (водопользователей) по горизонтали между отдельными отраслями хозяйственного комплекса (аграрный комплекс, коммунальное хозяйство, объекты промышленности, рекреационно-курортной деятельности) и по вертикали между разными уровнями водохозяйственной иерархии (высшая иерархия – бассейн в целом, с последующей разбивкой на системы более низкой иерархии использования природного ресурса вплоть до отдельных небольших частных водопользователей).

Бассейн Куяльницкого лимана характеризуется крайне высокой сельскохозяйственной освоенностью территории, которая составляет порядка 48-50%. Сельскохозяйственные угодья составляют порядка 81% (184,9 тыс. га) общей площади бассейна, из которых 74,8% - пахотные земли. В пределах прибрежных полос водных объектов бассейна состав угодий следующий: пашня – 14%, сенокос – 16%, пастбища – 29%, приусадебные участки – 20%, леса, лесополосы и кустарниковые заросли – 9%, иные угодья – 12% [4, с. 45; 5, с. 18].

Объекты промышленной инфраструктуры бассейна Куяльницкого лимана представлены в основном предприятиями перерабатывающей промышленности аграрного комплекса и небольшим количеством карьеров, эксплуатирующих месторождения строительных материалов [3, с. 45].

Увязка основных водопользователей в схеме интегрированного управления водными ресурсами бассейна Куяльницкого лимана должна строиться с учетом оценки использования водных ресурсов территории, которое составляет 60-100% годового стока рек бассейна. Проведенные исследования показывают, что ежегодные суммарные потребности ресурса в бассейне Куяльницкого лимана составляют порядка 12,5 млн. м³, безвозвратное потребление – 9,32 млн. м³. При этом ежегодный забор воды различными потребителями составляет: непосредственно из реки Большой Куяльник – 5,84 млн. м³, из водохранилищ и ставков – 0,46 млн. м³, из подземных источников – 6,19 млн. м³. Сброс возвратных вод составляет порядка 3,16 млн. м³.

3. Расчетные показатели составляющих водного баланса бассейна Куяльницкого лимана в схеме интегрированного управления водными ресурсами территории с учетом значительной их трансформации под влиянием водохозяйственной деятельности, а также относительно коротких рядов наблюдений за гидрометеорологическими характеристиками, определяются на основе расчетных характеристик модели «климат-сток» [6, с. 345; 7, с. 23].

Оценка притока пресных вод в бассейне Куяльницкого лимана на основе модели «климат-сток» показывает, что основная их часть поступает за счет притока речных вод Большого Куяльника. Общий объем речного притока в естественных условиях составляет порядка 24,0 млн. м³, из этой величины на р. Большой Куяльник приходится около 22,3 млн. м³ или 92,9% [7, с. 124]. Средняя многолетняя величина поступления воды за счет выпадения атмосферных осадков составляет порядка 26,6 млн. м³, однако с учетом потерь на испарение с водной поверхности объем лимана ежегодно пополняется только на 2,24 млн. м³. Причем рассмотренные различные сценарии глобального потепления показывают, что в ближайшие годы испарение с водной поверхности Куяльницкого лимана будет значительно превышать поступление атмосферных осадков к его поверхности.

Основным фактором водохозяйственной деятельности в бассейне Куяльницкого лимана являются искусственные водоемы, которые в условиях зоны недостаточного увлажнения играют фактически роль искусственных испарителей. Относительная площадь водной поверхности искусственных водоемов по данным различных источников изменяется от 0,20% до 0,40%. При этом уменьшение речного стока в маловодные годы, может достигать 40%, умень-

шаясь до 10% в многоводные годы. Большинство искусственных водоемов в пределах исследуемой территории в настоящее время находится в пересохшем состоянии и их негативное влияние на формирование речного притока воды в лиман оказывается максимальным в весенний период при снеготаянии и ливнях, когда в средние по водности и многоводные годы на заполнение данных водоемов расходуется до 35-40% нормы речного стока, а в маловодные годы данные безвозвратные потери могут достигать 90% природного стока.

4. Общественное участие не только в управлении, но и в финансировании, планировании и развитии водохозяйственной инфраструктуры.

Под «общественным участием», безусловно, понимается участие не только исключительно общественных организаций и объединений, но и обязательное участие местных органов власти, самоуправления, муниципальных водопользователей. Участие общественности должно обеспечить, в первую очередь, атмосферу прозрачности и открытости, при которой вероятность принятия решения, не отвечающего интересам местных общин, значительно снижается.

5. Приоритет природоохранных требований в деятельности органов управления во время практического применения схемы интегрированного управления водными ресурсами бассейна Куяльницкого лимана.

Экосистемный подход вытекает из одного важнейшего постулата – «природа – равноправный партнер». Данное требование означает необходимость определения максимально возможного уровня антропогенного влияния на водные ресурсы с целью обеспечения уровня их устойчивого восстановления, минимизации в количественном отношении негативных последствий взаимодействия источников воды и экономически используемых территорий [2, с. 19; 9, с. 137].

По данным [8, с. 129; 14] в Украине на сегодня отсутствуют регионы, в пределах которых фактическое использование водно-ресурсного потенциала меньше экологически допустимого уровня. Только для восьми областей данный показатель находится на уровне его критических значений (0,30), а для Житомирской, Харьковской, Луганской и Донецкой областей его показатели составляют, соответственно, 1,0; 1,60; 1,40 и 1,20, что означает – данные административно-территориальные единицы Украины осуществляют свою водохозяйственную деятельность за счет водных ресурсов, которые формируются на

иных территориях. Для Одесской области, в пределах которой находится бассейн Куяльницкого лимана, показатель использования водно-ресурсного потенциала превышает его критическое значение и составляет 0,50.

Безусловное и первоочередное применение экосистемного подхода при разработке схемы интегрированного управления водными ресурсами в бассейне Куяльницкого лимана обусловлено уникальностью природно-ландшафтных комплексов территории, сосредоточением разнообразных степных, петрофитных, кустарниковых, прибрежно-водных луговых биоценозов, целесообразностью создания в ближайшие годы в пределах водного бассейна лимана национального природного парка.

Необходимо также отметить, что использование Куяльницкого лимана и прилегающей территории должно осуществляться на началах сбалансированного развития, т.е. с учетом экологической, экономической и социальной составляющих. После подписания Соглашения про ассоциацию с ЕС Украина взяла на себя обязательства имплементировать в природоохранное законодательство ряд директив, шесть из которых касаются качества воды и управления водными ресурсами. Именно поэтому рациональное использование водных ресурсов лимана и сбережение его экосистем должны лечь в основу схему управления этим объектом.

6. Вода должна быть определена как товар, который с учетом его важности имеет соответствующую экономическую и социальную стоимость.

Управление водными ресурсами Куяльницкого лимана как социально-экономическим товаром – способ достижения не только исключительно финансово-экономических целей устойчивого развития отдельных регионов и страны в целом, но и важнейший способ достижения социальных целей, связанных с обеспечением эффективного и равноправного водопользования, поощрения экономики и охраны водных ресурсов.

Подход «загрязнитель платит» является основным принципом всей европейской экологической политики. Обеспечение адекватного возмещения затрат на услуги водопотребления и водопользования, в т.ч. экологических и ресурсных затрат, находится на уровне общегосударственного правового обеспечения. Тем не менее, допускается снижение стоимости на восстановленные водные ресурсы исходя из экономических, экологических и социальных соображений, а также с учетом географических или климатических условий.

7. Информационное обеспечение системы управления, экономическая и финансовая стабильность обеспечения схемы интегрированного управления водными ресурсами бассейна.

Экологическая составляющая модели интегрированного управления водными ресурсами Куяльницкого лимана должна находиться на уровне первоочередных задач как неотъемлемая часть водно-ресурсного потенциала территории. Необходимо учитывать тот факт, что уменьшение показателей качества воды в свою очередь уменьшает экономическую и социальную стоимость водно-ресурсного потенциала бассейна и как следствие уменьшает экономическую привлекательность территории, существенно сужая возможности применения механизмов устойчивого развития региона.

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The role of interactive learning tools to improve the quality of bachelor lawyer in «International Relations»

Abstract

In the article key aspects of interactive learning tools application in improvement of bachelor-lawyer training quality, methodical and technological advantages of digital educational resources in training are considered. The purpose of the research is a definition of role and value of interactive training resources in improvement of bachelor-lawyer training quality in the «International relations» direction. Intensive informatization of all spheres of the person activity defines one of the main requirements of the social order of post-industrial information society for higher education - training the graduates capable to be guided in a huge flow of information, to apply new information technologies and various information sources in the future professional activity effectively. This fact indicates necessity of introduction of innovative approaches in higher education training, including innovative educational programs,

and also focuses on transition to training with the latest information technologies application.

Keywords: informatization, information technologies in training, interactive training resources, electronic textbook, interactive board.

Introduction

Twenty first century characterized like “century of information”, “century of computerization” and modern society like “information” which is characterized by:

- The growing role of information, knowledge and information technologies;
- Gathers pace informatization of society, the implementation of new information and communication technologies;
- Creation expanse of information e.t.c.

The growing role of information evidenced by the fact, that on 27 March 2006, the General Assembly of the United Nations adopted a resolution that declares May 17 as the International Day of the information society.

To date, involved in the expanse of information are all areas of life as society and human in particular. In its turn, education as the basis of socialization in the society, can not remain in this process bystander. Informatization of education today - it's not so much a tool for assessing the quality of education as a means of interaction between the education system and society as a whole. To high school new demands, pointing to the need to improve the training of the graduates, aimed at raising the level of professionalism of the graduate, the formation of topical and popular professional competencies, including skills required for self-realization in today's information society.

Pedagogical practice, normative acts of the Russian Federation relating to the education sector, the requirements of employers to graduates show that traditional methods and means of education is not enough to generate the required set of professional competencies, and achieve the necessary for a modern society the level of professionalism of graduates.

Informatization of the society requires education, the introduction of innovative approaches to learning, including innovative educational programs, including the transition of the learning process for new modern electronic, computer, Web-based

technology, on-line system of learning, i.e, the transition to training with the latest information technologies and means of teaching.

New educational and information technologies make it possible to achieve the goal of modern education. Informational technologies are pedagogical technologies, applying special techniques, program and technical resources for information (computers, educational films, audio media, video media, interactive whiteboards). The introduction of information technology in the learning process allows for the most effective implementation of the possibilities inherent in teaching technology. The use of new interactive learning tools in conjunction with the selected pedagogical technologies contributes to the quality of training of graduates, increase the level of motivation and interest of students, and as a consequence, lead to the successful formation of the necessary professional competence.

Methodology and/or theoretical part

Learning tools is objects, materials used in the educational process in order to achieve learning objectives. Interactive learning tools enable both students and teachers actively engage with learning tools that operate on the basis of information and communication technologies (ICT) in real time. Interactivity means has a number of advantages: a high level of visibility, combining the use means, access to a wealth of information to the Russian and world information resources, the ability to manipulate objects on the screen, use hyperlinks to assess student performance.

The factors that determine the effectiveness of interactive learning tools are the following:

- high level of interest of students;
- high motivation of students;
- visual materials;
- opportunity to use a variety of teaching methods;
- the possibility of age-appropriate students, their level of training;
- the possibility of age-appropriate students, and take into account their level of training;
- access various information resources, including international;
- self-control and self-study [1, 2].

Currently, these opportunities of interactive features realized in electronic textbooks, as well as when use multimedia and interactive whiteboard. Consider interac-

tive learning tools that improve the quality of bachelor's lawyers, particularly bachelors in "International Relations".

Multimedia is a set of computer software tools that allow you to combine the provided information in various forms (graphics, sound, video, text, animation). Traditional lectures through the media become a new form. Lectures, presentations, the use of slides, audio, video, graphics, animation, contribute to a more successful absorption of new material, using audio and visual memory of students. [3] On the basis of the media to create an electronic textbooks and manuals. Electronic textbook has several advantages over print counterparts: a large dynamic content of electronic textbooks, the use of hyperlinks that allow access the additional or specific information, the increase of information visualization, distance learning with the help of this textbook provides an automatic control of acquired knowledge by means of tests on the themes and sections of the electronic textbook. Hyperlinks are used in the preparation of the electronic textbook, allow access to reference material in the study of new material, allow access to the information resources of digital libraries for educational and reference Web-resources [4].

Whiteboard is an effective learning tool. The device, which allows the teacher to use both screen and interactive whiteboard. Interactive whiteboard – a large touch-screen monitor through which the teacher controls the computer, draw, create graphics, print text, identifies the area on the screen with the electronic pen, draws diagrams, tables, images. Whiteboard allows you to combine the presentation and high-tech technologies [5].

Whiteboard allows to solve the several problems:

- Increases the utility factor used instructional time as reducing the time spent on drawing diagrams, tables, it increases the time for the presentation and study of new material, which contributes to the efficient use of classroom time on a detailed study of a theoretical question or a retraction of more attention to the solution of of practical tasks;
- Increasing the efficiency of presentation of educational material. Interactive whiteboard has several advantages over other means of training when using the maximum set of tools, based on the technological feasibility of a particular type of interactive whiteboard;
- the possibility of active work with the computer directly to the interactive whiteboard;

- Group work (group games) of students using the interactive whiteboard.

The text, parts of text, drawings, and other objects can be moved on the screen, resized, copied to the computer's memory, delete, modify, recover, that will take you back to the material at any time and restore the original position. Screen of Whiteboard can be divided into parts, which can be used in various work, working with a group of students.

When using the interactive whiteboard in teaching students become full participants in the learning process. The teacher, in turn, becomes a consultant, indicates the direction that puts the task, and should create all the necessary conditions for the activity of the student.

With regard to the methodology of teaching in higher education, the use of the latest learning tools has a significant influence on the choice of teaching methods. The use of interactive learning tools allows to diversify the teaching methods.

Consider these methods of training as explanatory and illustrative, research and search, the method of monitoring and correction of theoretical knowledge and practical skills of students by using interactive learning tools in higher education.

Explanatory and illustrative methods involves the use of on-screen tools in the learning process, such as video, volume, complex illustrations, presentations, slides.

Teacher and students to create a presentation that can act as information support during the preparation, when reading new material or when summing up the topic or a module as an illustration of the main findings, key points of the topic.

The use of interactive learning tools contributes to development of students' information competency, job skills with modern information technologies necessary for future professional activities. Perhaps the use of interactive media as a research tool, a source of additional, reference or legal information on the topic as way of organizing learning activities, self-organization and self-education. The process of learning using interactive media purchases a creative character, develops logical thinking of students, promotes the formation, and further improves the skills of self-presentation and public speaking of bachelor's lawyer.

Electronic textbooks, multimedia through its impact on all major sensor systems learning - auditory, visual, kinesthetic, promote the most effective learning of educational material, increased the interest of students to the subject. Research retrieval method using the latest information technologies primarily focused on the use

of computer in learning tools and resources on the Internet. Especially worth noting integration character of the method to identify and trace the interdisciplinary communication of disciplines. Research retrieval method using the resources of the Internet allows us to study questions of discipline from different scientific point of view, to follow the dynamics of development (for example, assumptions and changes in the law) in different historical periods. Research retrieval method using the resources of the Internet allows us to study questions of discipline from different scientific point of view, to follow the dynamics of development (for example, assumptions and changes in the law) in different historical periods.

The method of control and correction of theoretical knowledge and practical skills of students using the interactive learning tools in higher education allows the teacher to use different forms of the control of knowledge, skills and competences formed using a variety of information technology.

In this case, to verify the acquired material, various types of tasks: the form, level of difficulty, etc. For example, tests can be represented by closed questions (the students choose the Variant of answer from the offered), open questions (students inscribe their own answer, answers in the test absent), structurally complex layered with small tips. Electronic textbook allows include in tests links to background material in the event of difficulties with the answer, practice tests, a set of tests for each topic (section), module and final.

Implementation (practical part)

The main directions of practical application of interactive learning tools in higher education to improve the quality of bachelor's lawyers, particularly bachelors in preparation of "International relations" on the basis of the disciplines of international legal cycle ("International Law", "International private law" and others).

Today received widespread use of multimedia tools in the learning process. Lectures, presentations, slides, audio and video enhance the interest of students to the study of new material, in practice, contribute to a better absorption of theoretical material.

Material resources of the Internet can also be used for educational purposes by showing them through multimedia equipment. Videos of of court hearings Russian and international courts, posted on the Internet, can be used in the primary visual ac-

quaintance with the features of civil and arbitration process in Russia and features of litigation in international courts.

Thus, the study of the topic "Civil procedural rights of foreign citizens and stateless persons" preview video of the court session with the participation of foreigners and stateless persons introduces students to the peculiarities of the Russian courts considering cases involving these categories of individuals.

The use of Internet resources as a learning tool in the study of international legal disciplines contributes to the formation of legal culture of the students and allows to explore in depth the new material: regulations, court decisions, including international ones, to shape a political culture, a sense of direction in the flow of information.

Effective use of interactive media at a round table and the Student Conference. Information technology, Internet resources can more effectively carry out the preparations for the round tables, student research conferences. At the preparatory stage, students are encouraged to choose the appropriate audio and video theme, opinions of scientists, policy makers, law enforcement officers on the discussion to analyze the collected material, to give their own assessment, then to present prepared and structured the material for discussion by the audience. Thus, the activated research activities of students, develops logical thinking, analytical skills, enabling bachelor's and lawyers to participate directly in the preparation, organization and holding of round tables and conferences on the same topic, as well as contributes to the formation required in the professional field of competence.

One of the requirements for a modern system of higher education is to increase the role of self-education, self-study students, that is, enhance their research activities. It is advisable in this case, the introduction of such forms of work as a self-presentation of creative, research, presentation of projects, etc., which contributes to improving the skills of information technology, skills, selection of information, its systematization.

The effectiveness of the use of interactive whiteboard shows the following example of its application in the study of one of the subjects of the international legal course "International Private Law".

One of the key topics of the course "International Private Law" is the theme of "Conflict of laws". Originally, it is familiar with the basic concepts, features and characteristics of the conflict rules. Disclosure of the subject matter requires consideration of various sources: the Civil Code of the Russian Federation and other normative le-

gal acts of the Russian Federation, laws of foreign countries, examples from the jurisprudence previously studied topics. It is necessary to take into account the limitations of classroom time, the individual characteristics of students, the level of preparedness of their legal and how much earlier the learned material. In order to intensify the educational process, and demonstrate the required material selection interactive whiteboard in the explanation of the topic is, in my opinion, the most successful [9].

Using the interactive whiteboard - it is simple and at the same time the creative use of materials. The required files or pages can be prepared in advance, via hyperlinks to link them to other resources (the basis of Russian regulations, international legal acts and regulations of foreign countries), which will be available in the class, which is easy enough, you can apply to the process of learning new material or consolidating previously studied. Interactive whiteboard because of its technical capabilities allows us to develop a theme based on one prepared file, helping to plan and contributes to the favorable course of employment. On the whiteboard, you can easily move objects and inscriptions, add comments to the text, graphics and diagrams, highlight key areas and add color. Besides text, images or graphics, you can hide and then show it in the key moments of lecture.

Pre-arranged tables, text, pictures, diagrams, music, videos, adding hyperlinks to multimedia files and Internet resources will set the appropriate accelerated pace of the class: there is no need to spend time writing a text on the board, build tables, etc. as on a conventional board. All material submitted to the whiteboard, you can comment in real mode without departing from the board, changing and supplementing it directly on the screen using a stylus or a finger, and keep records for future studies. Files can be opened earlier sessions and had to repeat studied material. Pages can be placed on the side of the screen, as sketches, and a teacher at any time has the possibility to turn to the previous step of classes and repeat main elements and sections of exercises [10].

Similar techniques using the latest information technologies attracted the active participation of students in the classroom. With a variety of materials that can be used on the interactive whiteboard more students to quickly grasp new ideas.

With skillful use of the technical capabilities of the interactive whiteboard stock image, audio and video, graphic materials is limitless because there is a huge amount of resources that are applicable for educational purposes, in the Internet: electronic libraries, official sites of the international organizations, the official news

sites of government agencies and other resources, bachelor's and lawyers needed for successful mastery of skills.

The increasing popularity of electronic books are gaining. Electronic textbook- it is an effective means of distance learning, when the teacher conducts training, are at a considerable distance from the student. On a computer screen displays a slide presentation demonstrated by the teacher, which is broadcast over the Internet. The student in this case has the opportunity to make a mark for themselves in the electronic textbook, select, for example, the material is difficult to understand, requiring additional information. These marks remain in the textbook learning and he may at any time to return to them. The technical possibilities allow effective when used textbooks absentee-distance learning [11, 12, 13].

Electronic textbook has its functional load. It is known that the efficiency of absorption of the material is directly dependent on the interest of the student and the learning process itself (the chosen means, forms and methods of education). Properly chosen medium of instruction is the key to successful assimilation of the material, to acquire the necessary skills. Less effective is the assimilation of plain text material than the material with a variety of visualization tools. This can be audio, video, images, animations, etc. Electronic textbook can be designed in a way that will show the sequence of actions or processes: filling graph or chart that contains a large amount of contextual, information can be carried out gradually as the students read the Explanatory Notes. The student has the opportunity to determine the speed of learning the material submitted in an electronic textbook, taking into account its own characteristics, speed of perception. The student has the opportunity to determine the speed of learning the material submitted in an electronic textbook, considering its own characteristics, speed of perception.

When creating an electronic textbook is necessary to consider not only its content, but also how to present this information. To do this, choose the color scheme with the aim of reducing the burden on student's eyes. Colors should be calm, avoid using bright, "flashy" colors, you must combine the colors together. In addition to the color on the eye fatigue, and greatly affects the font size of the text. Small text is much harder to read, but at the same time much larger text may also reduce the effectiveness of training, as this page will be placed much less information and therefore reduce the proportion of training time by increasing the number of page turning.

In addition, logically interrelated information will be posted on the different pages that make it difficult to complete perception.

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Set out in the electronic textbook material should be divided into large sections, titles of which are given in the table of contents of the textbook. Each section, in turn, is broken down into smaller thematic blocks that student can choose when working with a table of contents. The hyperlink will open a page with the necessary material when selecting a section from the list. Likewise, you can make reference to extra reference material with the introduction of the definition of the subject studied, a reference to the regulation, judicial decision, etc. additional information will be treated mainly illustrations, tables, statistical data provided in the form of pop-up windows.

Electronic textbook allows you to put in a material of varying complexity for different categories of students by level of complexity of the material being studied.

Electronic textbook - an effective tool for learning. After studying the study of a particular module (threads partitions) can be offered to the control questions, assignments, tests and practical tasks needed to secure the learned material with the ability to automate the processing of the responses received. After these results it is possible to repeat the material covered again, re-apply to the undigested themes, gaps and track, respectively, to fill them with the necessary knowledge and skills.

Electronic textbook in addition to the above is another important advantage. Especially it concerns the rapidly changing legal framework of the Russian legislation. Electronic textbook as opposed to repeatedly printed analogues allows to modify it, making it relevant and correspond to reality, which is important in training lawyers.

Analysis and evaluation of development

The introduction in training such means as a interactive whiteboards, electronic textbooks in higher education gives great opportunities for vocational training in the future. In the educational process there are many different ways to use interactive tools, especially software applications.

Based on the practical application of interactive media in teaching the disciplines of international legal cycle can identify a number of advantages of working with these tools:

1. Interactive media are acceptable in teaching students of all ages, including those in higher education. Any discipline any difficulty loading of information allows you to make the subject more accessible to the perception and, consequently, for the development and application of acquired skills in practice.

2. It allows you to access a wealth of information, visualize it, and presented in a convenient format, seek simultaneously to the various sources of information, including Web-resources.

3. It provides more opportunities for interaction with the audience and discussion, participation in teamwork, personal development and social skills for future professional communication. This makes the classes more lively, interesting and exciting for both students and for teachers, while increasing the motivation of participants in the educational process, as a result of studying to understand more complex ideas and concepts as a result of a clear, effective and dynamic material supply teacher [14, 15, 16].

4. Interactive learning tools let you use a variety of learning styles, teachers can access all kinds of resources, adapting to a certain age and needs, the level of information and practical training of students [17, 18].

Drawing on its own experience in the use of interactive learning tools, it is important to note a number of factors necessary for successful use of the funds:

1. Availability of interactive media in higher education institutions for use in the classroom, both for teachers and for students.

2. Provision of a trained instructor lesson using interactive tools.

3. Active applying the teacher resources in practical teaching activities to achieve the level of confidence the user to better use of the funds involved.

4. Establishment of interdisciplinary connections, including among teachers of disciplines to share resources and ideas.

5. High level of reliability and technical support in order to minimize potential problems when using interactive media in training [19].

Conclusion

Information technologies opens up new possibilities for improving the educational process in higher education, open up broad prospects for the most effective implementation of the priority tasks of education at the present stage. Activate and make independent and creative collaboration of students and teachers.

Interactive learning tools with all its diversity and usefulness can improve the quality of training students, especially lawyers in the direction of "International Relations". Increasing the diversity of interactive tools allows you to make learning more effective, non-traditional, saturated, and allowing to complement material of the disciplines of information from adjacent areas. Construction of the educational process with the use of modern interactive learning tools in the classroom and during extra-curricular time helps to maintain student interest in learning, a high level of self-motivation and improves the quality of training of graduates, in particular bachelor lawyers in the direction of preparing «International Relations».

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Modern aspects of interaction between small and large businesses

Abstract: Discussed are key aspects of modern interaction between small and large businesses. Focus is placed on their mutual complementarity. The aim is to present the import of each side of this partnership.

Keywords: big business, small business, partnership, benefits.

According to the most common review in the economic literature on the links and relationships between small and large businesses do not capitalize on strong alternative "either small or large" and on the complementarity of each other. The initiative is two-way - small offer introduction of new components and assemblies in the production of large and big business boost innovation in small, placing stringent demands on the technical level of knots and details supplied by them [5]. Interest of complementarity is based on the understanding [6] everyone deals with what can best and everything else to take advantage of others who are able to do other activities better and cheaper.

Especially effective for big business is attracting smaller organizations to inefficient and economically unjustified activities. Quest in the following three areas [2] - optimization of organizational structures, better access to new markets and specialization as a result of the division and cooperation. "This development represents a real challenge for the adaptive ability of the business". [4] Depending on economic conditions corporations take advantage of the features and advantages of small businesses with their involvement in strategic implementation [3].

Optimization of corporate organizational structures. Big business has the resources to put outside the organizational structure inefficient units whose support is economically unjustified. Restructuring is an option for optimization of companies' activity. In most cases these are units carrying out preparatory or auxiliary-ending activities; activities whose implementation does not require specialized equipment and

technology; production of unique single units, machines and equipment for production of small series in order; production of standard parts for the manufacture of which does not require specifications (nuts, bolts); repair and preventive maintenance of equipment, and so on.

The emergence of this need is determined by accelerated product innovation and technology. The company became unprofitable capturing and maintaining these industries, particularly in more sophisticated and complex products. Declining serial production and increased flexibility of the range limit profitability in the introduction of expensive advanced technology manufacturing, relatively small volumes. Cost benchmarking of own production and its price at delivery outside is an objective evaluation of performance. Big organizations concentrate on core industries. For other industries seek co-partners. They are medium-sized businesses who seek close cooperation with subcontractors from small businesses to implement concrete actions in order of largest organization. Corporations advantage of small and medium organizations to give flexibility to the structure and adequately respond to changes in the environment. The interaction received from small organizations productivity savings and improved quality increase competitive potential.

Optimizing costs of access to new markets. When entering new markets large organizations enjoy the benefits of fatty smaller organizations. The economies of developing and other countries is characterized by a combination of preventive barriers to imports. The policy of these governments is aimed at stimulating domestic production. For large organizations become more profitable option to move production to the new market destination and create a network providing local small and medium-sized suppliers. Their good awareness of local politics, government regulation and market characteristics to attract further cooperation.

Initially, companies outsource small organizations the simplest business processes that are crucial for competitiveness ability of the products. Subsequently big business sets the parameters of improvement and initiate technological development in small organizations. Reaching the required level to manufacturing standards, guide and encourage the application of innovative technologies by investing in joint projects. Great organization modeled progress in small and medium. Starts partnership with suppliers with limited organizational capabilities that forces you to work in a competitive environment. The advantages are low value of the product / service. Deficiencies are associated with outdated technology. In the process of interaction

company produces modernization of technology and standardization of qualitative part of them.

Advanced small business driven significant improvements in the value chain. When needed largest organization provokes progress in some advanced small organizations. It creates innovative small organizations servicing technologically sophisticated industries in the large organization. They have the most significant impact on increasing competitiveness. Such an approach to creating a local network of suppliers is attached automotive Turkey, Brazil, Argentina, Mexico and others.

Taking advantage of niche small business. Accelerating innovation progress globally increases the number and range of our products. This trend determines cooperation and specialization. Large organizations increasingly transferred from business processes to small and medium-sized organizations. Specialized small business with increased production achieves economies of scale. Attracting them by big business was prompted by the possibility of avoiding investment in expensive and non-profile specialized equipment. Another reason is the savings from wages.

Companies substantially reduce costs for research and development by making the small businesses creating high technological developments. Furthermore, for a large organization it is much easier to supervise a small one. The transfer of certain functions to high-tech small organizations is simple and inexpensive to large. Small innovative organizations involved in the elaboration and trial utilization of scientific technical innovations do not require large investments. "Small businesses in the United States produce four times as many innovations per employee compared to big and cost of a researcher or engineer are twice lower" [1]. Joint cooperation in this sphere allows the largest organization significantly shorten the period of developing new types of products and to increase the share of new products in total sales volume.

Benefits for Small Business of cooperation with big [5]. Large businesses provide better access to capital.

Cooperation with big business allows small organizations to reach high level of production standards and continuously improve them.

Small business is more volatile and more dependent on the external environment. Cooperation with big increases its stability and sustainability.

Building long-term partnerships with big business based specialization and cooperation has a significant impact on the prosperity of small.

Great organization transmits its small partners of its production and management experience.

Financial support in the form of equipment leasing and another is an important incentive for the small organization.

Possibility of a small organization from a supplier of simple nodes and details to become a manufacturer of precision instruments and sophisticated machinery.

Ability to provide permanent production capacity - market stability.

Possibility of entering new markets in which big business has captured market share.

Access to technology and patents.

To use the corporate brand of the great organization.

Small businesses reaching technological leadership are able to sell profitably to large ones. Provides strategic customer and partner in the expansion of the business.

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Saving-Investment Gap and Economic Growth in Developing Countries: Simulated Evidence from Selected Countries in Africa

ABSTRACT

It is a challenge for most developing countries, especially in Africa, to mobilize domestically enough capital to meet their extensive investment needs because of two main reasons: the undeveloped nature of their financial system and the low rate of access of households to basic financial products. This study analyzes the impacts of persistent savings (S)-investment (I) gaps on economic growth using a sample of 5 developing countries in Africa - Egypt, Côte d'Ivoire, Ghana, Kenya and Nigeria. The methodology of this study is based on a Ramsey model within a general equilibrium framework where consumption and savings are the determinant factors in a typical household's utility function. Calibrations and simulations indicate significant gaps between optimal and actual levels of savings and investment. Furthermore, the findings point out that these gaps are associated with relatively lower growth rates of actual output compared to simulated output, with the notable, but limited, exception of Nigeria until 2019. It accordingly becomes appropriate to suggest policies addressing both the structural and non-structural factors that limit the ability of these developing countries to effectively bolster households' deposits.

Keywords: savings-investment gap; economic growth; developing countries; Africa; JEL Classification: E27, O11, O55.

1. INTRODUCTION

Emerging countries in Asia have bolstered the long-established paradigm that identifies domestic savings as the backbone of any sustainable development

process. This stylized fact has generated lots of interests among academics and development partners as attested by the extensive body of theoretical and empirical studies that exists on the impact of domestic savings on real output. Another stylized fact is that developing countries in general, and the ones in Africa in particular, present a picture dually characterized by (i) low domestic savings in volume and as a share of gross domestic product (GDP) and (ii) the absence of both tangible and adequate policies to promote domestic savings.

With a financial system that lacks depth and breadth, let alone the absence of strong and effective regulatory institutions, African countries face challenges when attempting to mobilize capital domestically to meet their massive investment needs. It is critical that these countries explore in earnest means and ways to tap into their domestic markets in light of their limited access to international capital markets. Such an approach is viable and has the merit of making these countries less dependent on international capital markets. It also reduces the uncertainty associated with the collection of funds to finance the development of infrastructure systems or support other macroeconomic policy priorities. Indeed, the twofold goal of generating sustained economic growth and making a dent in the level of poverty is unattainable for African countries unless substantial direct investments in the creation, expansion and maintenance of infrastructure are made. In other words, domestic direct investment through domestic savings or domestic capital markets must be the centerpiece of the much-needed infrastructural transformation in African countries.

According to the World Bank's African Development Indicators [1], gross domestic savings as a fraction of GDP across Africa is relatively low. It roughly stood at 20, 17 and 21 percent in the 1980s, 1990s and 2000s, respectively. Comparatively, these figures were 28, 32 and 32 percent respectively for Asian countries over the same periods [2]ⁱ.

This paper endeavors to investigate through a dynamic simulation exercise the impacts of persistent and large savings-investment gaps on economic growth. It will derive in the process the costs associated with these low savings rates in terms of economic growth forfeited.

The literature abounds in papers pertaining to savings, capital accumulation and economic growth in both developing and developed countries.

It is impossible to entertain a substantive discussion about savings, capital accumulation and economic growth without referring to the pioneers of economic development and growth models of the likes of [3,4,5,6,7], among others. The common denominator of all these studies remains the indispensable nature of both savings and investment in achieving sustained economic growth.

As elaborated by [8], a country that does not generate enough savings to fund investment must find external sources of funding or incur a cost at the macroeconomic level in the form of “slow progress in [economic] development” Ultimately, such a cost will impact income distribution in a given country.

Many Asian countries (China, Japan and East Asian Tigers) have been renowned for higher rates of savings comparatively to other regions of the globe. These high rates have prompted some scholars such as [9] to examine the optimality of savings, more specifically, as it applies to China. Using an open economy Ramsey model with both perfect and imperfect world capital, they uncover that savings in China are excessive. This finding implies that current generations forgo higher consumption, which leads to a sub-optimal level of consumption in the economy, at equilibrium.

On another note, [10] focuses on India to explore whether or not domestic savings cause economic growth. Their methodology mainly utilizes two well-known estimation techniques in the literature: co-integration and maximum likelihood. In accordance with the neoclassical and post-neoclassical models of economic growth, they establish that savings have long-run effects on income. Furthermore, they find out that growth impacts savings as well-establishing thereby that there is a bidirectional cause and effect relationship between savings and growth. [11] comments on the relationship between the balance of payments of the United Kingdom (UK) and the savings gap. Through a careful analysis of trends in UK's investment-savings gaps from 1960 to 2007, she reaches the conclusion that the balance of payments deficit experienced by this country is proportional in size to the investment-savings gap. To promote savings and reduce this gap, she proposes among other policies the imposition of taxes on consumer credit and mortgages and the subsidy of savings.

In explaining both low savings rates and large savings-investment gaps in developing countries, [12] point to the scarcity of formal financial intermediaries in these environments where informal intermediaries have flourished. For instance,

there exist systems such as the Caja de Ahorros in Panama, Susu in Ghana and Ton Ton in Sierra Leone and Islamic banking, among others. Using macroeconomic identities, they determine, in the case of the latter, that savings-investment gaps are worsened as it promotes higher consumption.

This paper is organized as follows. The next section presents some perspectives regarding savings and investment in Africa. Section 3 discusses the macroeconomic model used in this study. In section 4, calibrations are made and results of simulations are shown and commented. Concluding remarks are made in the fifth section.

2. AFRICAN HOUSEHOLDS: SAVINGS PATTERNS AND HABITS

From their independence until the beginning of the 21st century, most developing countries in Africa heavily relied on overseas development assistance (ODA) to fund the bulk of investment needed to prop growth and create a sustainable economic development path. Consequently, the domestic and regional financial markets - as sources of funds - were neglected considering that no or few viable policies were actively implemented to shore up domestic savings, especially households' savings.

For the sample of African countries considered in this study, the average savings rates have hovered between 6 and 23 percent of GDP since 1980. Ghana for instance reached average savings rates of 6.2, 7.3 and 5.6 percent in the 1980s, 1990s and 2000s, respectively. These rates have remained modest, especially in the most recent years. Such a situation has underscored the heavy reliance of the country on foreign sources of capital to address its domestic investment needs. It is important to emphasize that all modern economies vie to create a competitive environment to attract foreign investment. However, one cannot stress enough the fact that foreign investment or foreign sources of capital should not be a substitute for domestic investment or domestic sources of capital, which is essential to sustain economic development and create a balanced growth path less subject to external factors or shocks.

On the other hand, Nigeria has exhibited higher rates of 19.6, 24.7 and 23.9 percent respectively in the 1980s, 1990s and 2000sⁱⁱ. These rates, although moderate, pale in comparison to those of a developing country such

as China, which boasted rates of 35.4, 41.1 and 47.3 percent, respectively, over the same periods (Fig. 1).

In sum, it appears that domestic savings rates are relatively low in most African countries, except for countries like Nigeria where these rates are moderate. It is noteworthy that the lion's share of domestic savings by African households is in the form of nonfinancial assets [13]. This fact compounds the existing challenges encountered in the mobilization of resources by drastically reducing the pool of resources available through the domestic financial capital market. A natural consequence of such an environment is a rampant savings-investment gap.

Furthermore, the bank access rate remains low in our sample of countries in particular and African countries in general. The latest figures obtained in 2011 show that these rates are below 50 percent for all countries in our sample (Fig. 2). Diligent efforts to improve the bank access rate will expand a great deal the pool of funds that can domestically be tapped into.

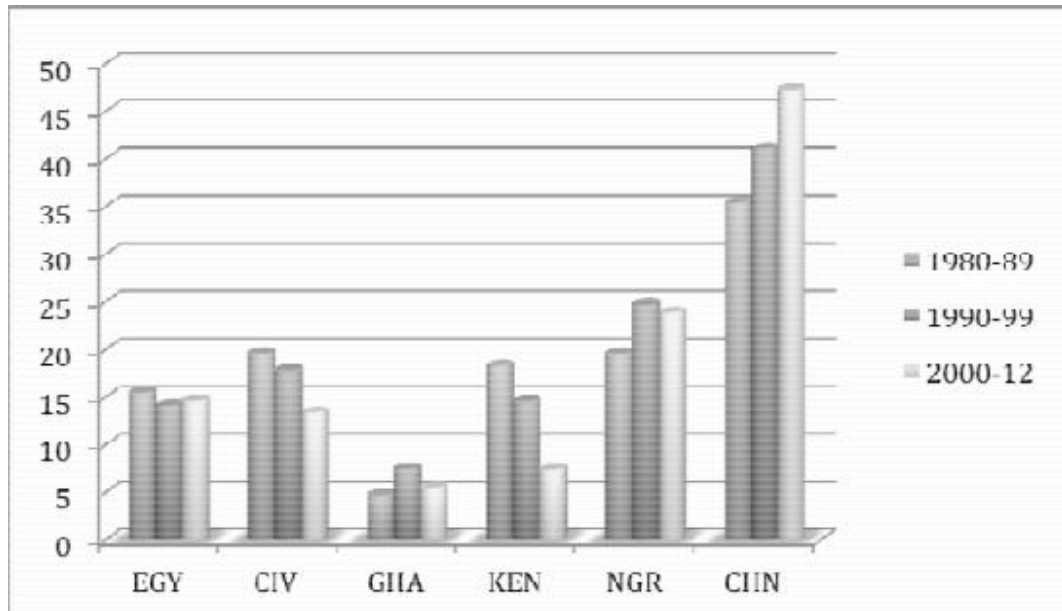


Fig. 1. Gross domestic savings (% of GDP)

Source: World Development Indicators (World Bank)ⁱⁱⁱ.

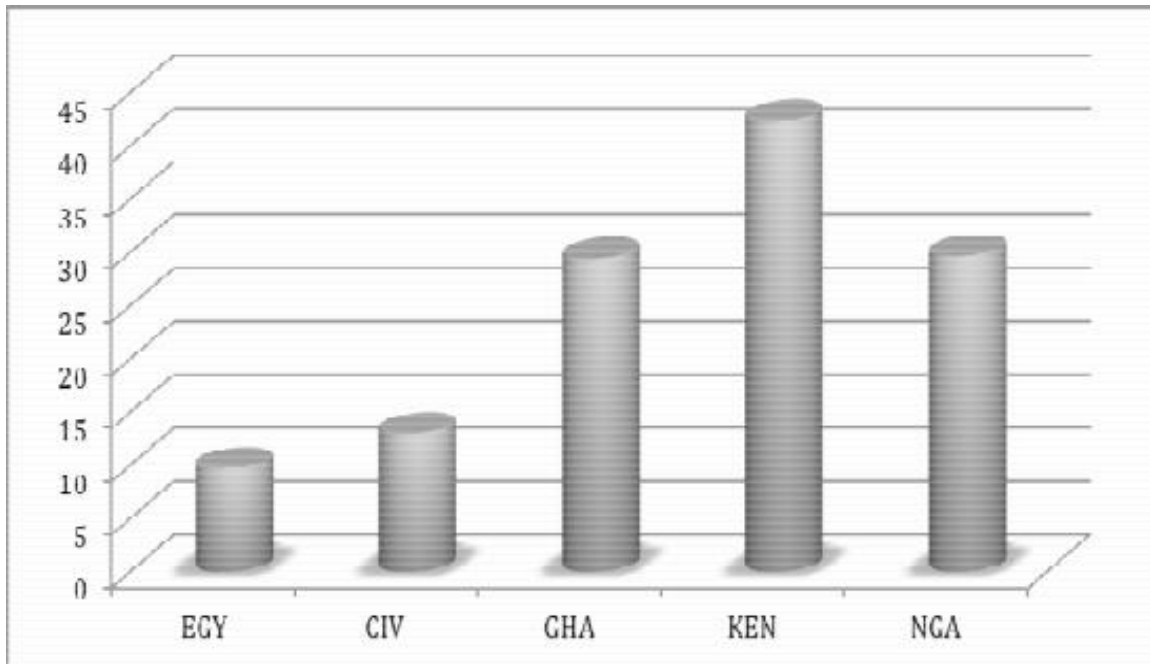


Fig. 2. Rate of Adults with an Account at a Formal Financial Institution (%), 2011^{iv}

Source: Global Financial Development (World Bank) and BCEAO (Central Bank of West African States), Annual Report, 2011.

3. MODEL

The methodology of this project is based on a Ramsey model within a general equilibrium framework. We assimilate each African developing country to a small-open economy with three sectors-household, firm and government. The model follows [14,15].

3.1 Household Sector

The representative household's lifetime utility depends on savings and consumption, which use up her entire income at each time period. The preferences of a typical household are captured by a (utility) function $U(.)$ that exhibits intertemporal dependency in consumption, through habit formation, and separability between consumption and savings. As a result, $U(.)$ can be defined as

$$U(C_t, S_t) = \alpha \log(C_t - \nu C_{t-1}) + (1-\alpha) \log(S_t), \quad (1)$$

where C_t and C_{t-1} represent spending on consumption goods at time t and $t-1$, respectively; and S_t is savings. We assume that both C_t and S_t are nonnegative, and the former is also nonzero. α is the fraction of household's

income spent on consumption, while v captures habit formation or any aspect of past consumption patterns subsequently carried over. More specifically, the past refers to the previous period, $t-1$, only. $0 < \alpha < 1$ and $v > 0$.

v is relevant in this formulation considering that a typical African household is more likely to adopt a rather conservative approach as far as consumption is concerned. Two main rationales could support this fact. First, the average size of a typical African household or “family” is large, and its definition is culturally different from the one prevailing in Western countries. Second, there is a relatively high poverty rate and a dominant rural population. Thus, it is likely that v will carry a relatively high value.

Optimality for the representative agent is reached when she maximizes her lifetime utility with respect to C_t and S_t subject to the budget constraint:

$$w_t L_t + r_t S_{t-1} + T_t = C_t + S_t, \quad (2)$$

where, at time $t = 1, 2, 3, \dots$, w_t and r_t are the remunerations of labor and capital respectively. S_t is savings and T_t accounts for government transfers received.

3.2 Firm Sector

Output production is characterized by a Cobb-Douglas function:

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha}, \quad (3)$$

where, at time $t = 1, 2, 3, \dots$, Y_t stands for output; A_t captures the state of technology and K_t is a measure of capital stock. Additionally, α is the partial elasticity of output with respect to capital – the capital share of output – and $(1-\alpha)$ indicates the partial elasticity of labor with respect to output – the labor share of output. The optimization problem for the typical firm sums up to choosing the appropriate levels of K_t and L_t that maximize its profit. That is:

$$\text{Max } A_t K_t^\alpha L_t^{1-\alpha} - r_t K_t - w_t L_t \quad (4)$$

3.3 Government Sector

The government of any representative economy has two sources of revenue: tax and borrowing. The latter is achieved through bonds issuance, while the former applies essentially to consumption in the form of a value added tax (VAT). The revenue collected serves two main purposes and is entirely spent at each time period. On the one hand, it is used to retire previous debt and it helps finance, on the other hand, a variety of social programs and the provision of public goods through transfers to households. Based on these premises, the government budget constraint is set up as follows:

$$\tau_t C_t + b_t = T_t + R_t b_{t-1}, \quad (5)$$

where, at time $t = 1, 2, 3, \dots$, b_t is borrowing (in the form of bonds issued) and R denotes the world interest rate that applies to borrowing contracted by the government on international capital markets^V.

Following the definition of the model, we proceed to solving it by deriving the first-order conditions and steady states that will serve as the basis for simulations.

The first-order conditions associated with the representative firm yield:

$$r_t = \alpha A_t K_t^{\alpha-1} L_t^{1-\alpha} \quad (6)$$

and

$$w_t = (1 - \alpha) A_t K_t^\alpha L_t^{-\alpha} \quad (7)$$

Equations (6) and (7) can further be expressed on a per capita basis:

$$r_t = \alpha A_t k_t^{\alpha-1} \quad (6')$$

and

$$w_t = (1 - \alpha) A_t k_t^\alpha \quad (7')$$

where, at $t = 1, 2, 3, \dots$, k_t represents capital per unit of labor.

The transition law of capital can be written as:

$$K_t = (1 - \delta) K_{t-1} + I_t \quad (8)$$

where I_t is investment at $t = 1, 2, 3, \dots$

Lemma: S_t is not different from I as government's savings does not exist, or is assumed negligible. In other words, $S_t \equiv I_t$.^{vi}

Using Equation (1) and lemma 1, Equation (8) becomes:

$$S_t = K_t - (1-\delta)K_{t-1} \tag{9}$$

Therefore, the final form of a typical household's budget constraint is:

$$w_t L_t + r_t S_{t-1} + T_t = C_t + K_t - (1-\delta)K_{t-1} \tag{10}$$

The Lagrangian resulting from the optimization problem is written as follows:

$$L = \sum_{t=1}^{\infty} \varepsilon^t [\alpha \log(C_t - \nu C_{t-1}) + (1-\alpha) \log(S_t)] + \sum_{t=1}^{\infty} E_{t-1} \varepsilon^t \lambda_t [Y_t + K_t - (1-\delta)K_{t-1} - w_t L_t - R_t S_{t-1} - T_t] \tag{11}$$

Using Equation (11), the first-order conditions are derived as follows, after rearranging:

$$\lambda_t = \frac{\alpha}{C_t - \nu C_{t-1}} + \frac{\alpha \nu}{C_{t+1} - \nu C_t} \varepsilon \tag{12}$$

$$\varepsilon^t \lambda_t \left[\frac{a(1-a)}{K_t} Y_t + \frac{a(a-1)}{K_t^2} Y_t S_{t-1} - 1 \right] = \varepsilon^{t+1} E_t \lambda_{t+1} (1-\delta) \tag{13}$$

$$\varepsilon^t (1-\alpha) \frac{1}{S_t} = \varepsilon^{t+1} E_t \lambda_{t+1} R_{t+1} \tag{14}^{vi}$$

The parameters of the model are a , α , δ , ν and E and the identified exogenous variables are R_t , A_t , w_t and r_t and T_t .

3.4 Parameterization and Calibration of the Prototype Model

After deriving the solutions to the economic problem, the simulation processes for the paths of savings and investment, and savings-investment gap, and output can be completed for Egypt, Côte d'Ivoire, Nigeria, Ghana and Kenya. This step requires the parameterization of our model that is summed up in Table 1.

Table 1. The parameter values

Parameters	Source	Values				
		EGY	CIV	GHA	KEN	NGA
a	WDI, AfDB	0.6	0.7	0.7	0.69	0.7
α	WDI, AfDB	0.8	0.85	0.83	0.7	0.65
δ	WDI, AfDB	0.08	0.095	0.086	0.081	0.045
v	Authors	0.6	0.65	0.65	0.65	0.65
ε	WDI, AfDB, IFS	0.891	0.95	0.814	0.842	0.887

In a second step, the prototype model is calibrated for each country using the year 2010. Simulations are conducted from 2010 to 2040 using the method by [16, 17]. As far as the data generating process is concerned, an AR (2) model is used for Côte d'Ivoire and Ghana.

For Nigeria and Kenya, an ARMA (2,3) is considered, while an ARMA (3,1) is found to be appropriate Egypt^{viii}.

4. RESULTS^{ix}

Fig. 3 reports the outcomes of simulations for Côte d'Ivoire (CIV) when the SI gap is contained and reduced. Indeed, from 2010 through 2040, the simulated gap remains on the average 52 percent lower than actual values. More specifically, this figure hovers around 46, 55 and 54 percent for the 2010s, 2020s and 2030s, respectively (Table 2). On the other hand, it appears that such a reduction in the gap for this country generates a substantial boost in output. This boost ranges between 10 and 13 percent over the period of interest through 2040, with an average of 12.5 percent. In other words, the country's real output level is expected to be about 12.5 percent higher than actual (real) output, on the average, if it were to diligently implement policies intended to halving the SI gap.

Table 2. Reduction targets in SI gaps (in percentage)^x

PERIOD	CIV	EGY	GHA	KEN	NGA
2010-2019	46.8371932	19.5196052	75.4863834	74.17878333	-
2020-2029	55.03938464	19.25681193	66.45335995	48.74071509	70.24448219
2030-2040	54.80382436	18.64896329	66.90283	30.54222683	73.04731857
Average	52.2	19.1	69.6	51.1	40

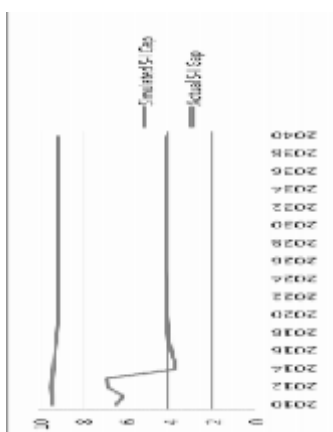
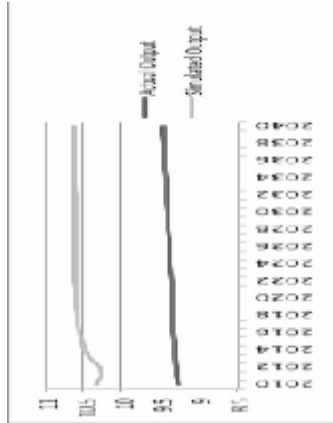
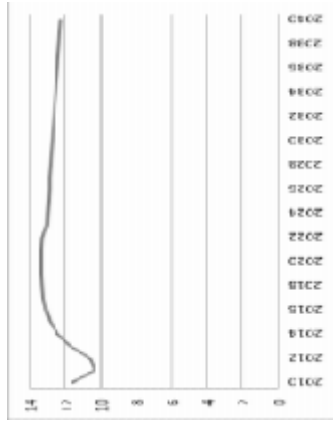


Fig. 3. Côte d'Ivoire

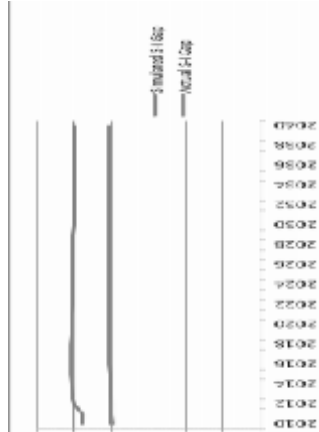
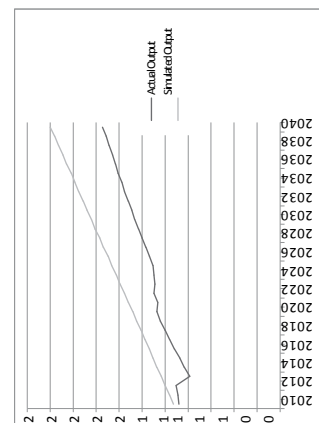
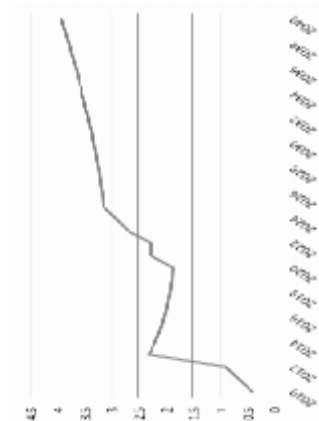


Fig. 4. Egypt

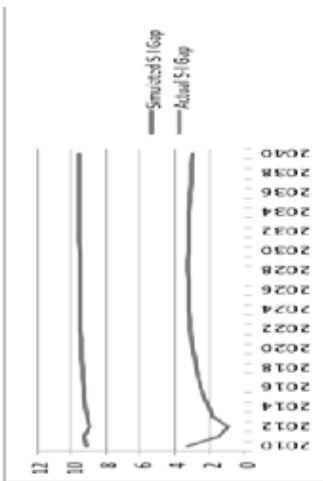
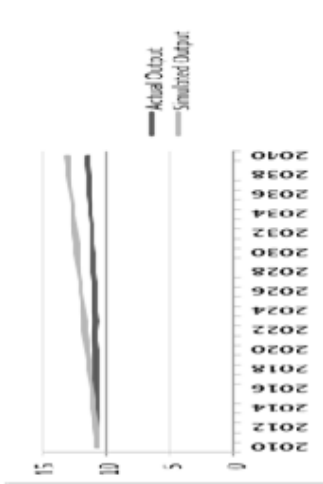
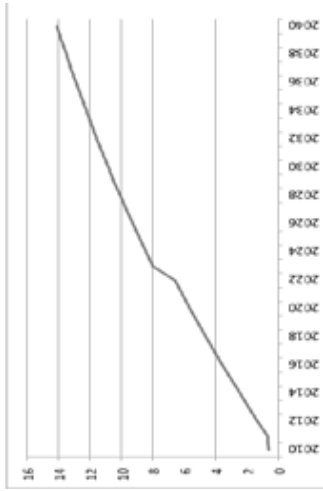


Fig. 5. Ghana

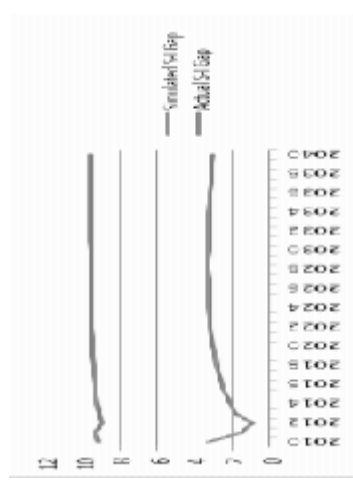
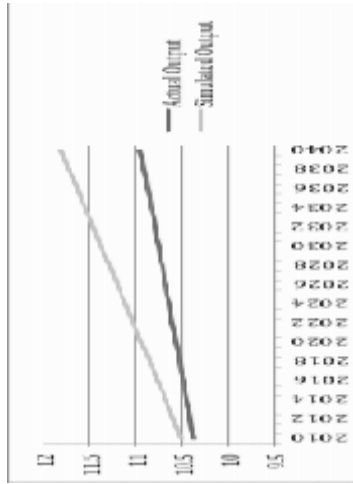
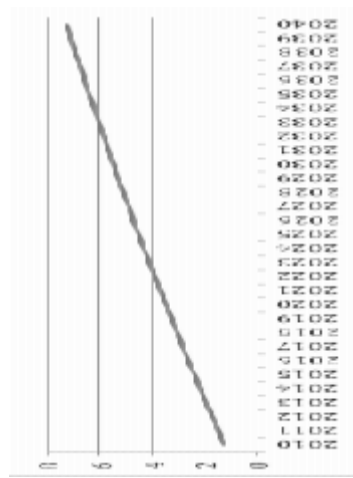


Fig. 6. Kenya

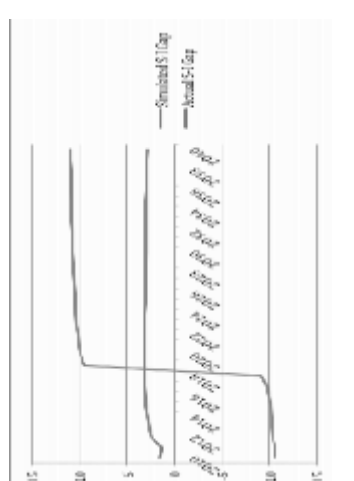
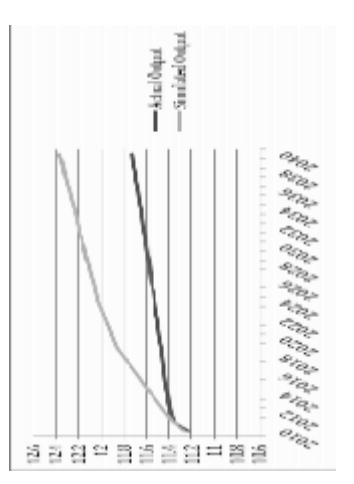
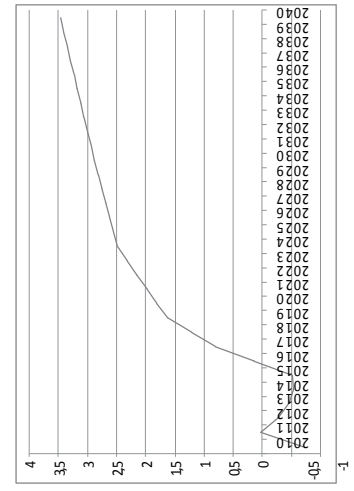


Fig. 7. Nigeria

As far as Egypt (EGY) is concerned, Fig. 4 reveals that the simulated SI gap is about 19 percent lower than the actual one from 2010 to 2040 (Table 2). By curbing this gap, the study points out that EGY will be able to reach a level of output about 2.7 percent greater than its actual level, on the average, over the period aforementioned. This figure is relatively small compared to the one of CIV. However, it is noteworthy that these simulations find out that EGY will cross the \$1 trillion landmark for RGDP in the vicinity of the year 2035.

As reported in Table 2, the simulated SI gap is found to be 69 percent below its actual level for Ghana, on the average. This is the largest decrease for the 5-country sample considered in this study (Fig. 5). This figure reaches a peak of 75 percent in the 2010s. Over the period of interest, the analysis shows that simulated output is about 8 percent higher than actual output once the reduction target of SI gap is achieved.

For Kenya (KEN) and Nigeria (NGA), the simulations reckon reduction targets of 51 and 40 percent, respectively, in SI gaps (Figs 6 and 7). These targets in turn bring about an additional real output gain of 4.5 percent for Kenya and 2 percent for Nigeria. For the latter country, the real output will cross the \$1 trillion mark around 2025, approximately 10 years before Egypt.

Moreover, a peculiarity is noteworthy. Indeed, until around 2019, simulations results indicate that savings surpass domestic investment. As a result, one notices that simulated output globally trails actual output over that time period. This finding is unique to NGA. However, from 2019 onwards, it appears that the trend is reversed as savings lag behind domestic investment.

This fact transpires as well in the comparison between simulated and actual output with the former outpacing the latter.

Overall, this simulation exercise for CIV, EGY, GHA, KEN and NGA has highlighted that a reduction in the SI gap is associated with a faster expansion of real output.

To reduce this gap in practice, concrete steps to reverse the low access rate of households to financial institutions could be taken to grow the available pool of domestic fund to finance domestic investment. Among other measures that could be impactful, a framework should be implemented to drastically reduce or eliminate altogether fees charged to individuals to open and/or operate a bank account - savings or checking. Indeed, these fees prove exorbitant in an

environment where tens of millions live with less than a dollar a day. Furthermore, paperwork must be slimmed down to the minimum, as obtaining certain documents, namely identity cards, can prove challenging for many [18]. Another approach that could be contemplated is the introduction of a well-thought subsidy scheme for savings, as advocated by [11].

Moreover, to increase the access of households to financial outlets, para-financial institutions and new technologies should be introduced and expanded. For instance, post offices and other microfinance institutions could be part of the solutions. It is also imperative that authorities develop safeguards that protect all depositors, especially the small ones, as confidence in the financial system is indispensable. This is crucial as illiteracy rates are still high in these developing countries. Indeed, it is unlikely that an illiterate farmer in some remote area will harbor enough confidence to deposit his hard earned income with any institution. As far as new technologies are concerned, the prevalence of cell-phone users in most African countries can be an asset in promoting mobile banking based on the experiences of countries like Kenya and Nigeria.

5. CONCLUSION

This paper has endeavored to investigate the relationship between SI gaps and output using a Ramsey model within a general equilibrium framework. Simulation exercises for a selection of 5 developing countries in Africa are conducted. Within our framework and the 5 sets of calibrations performed, results seem to conclusively point to positive impacts of reductions in SI gaps on output expansion. This finding suggests that the implementation of effective policies to decrease the SI gap could be considered as a viable option by decision-makers in their attempt to boost economic growth in their respective countries.

All in all, developing countries in general and African countries in particular should earnestly open a new chapter regarding the mobilization of resources to finance their vast investment needs. Mobilizing and relying on - their own - domestic resources should henceforth be front and center of that new chapter, which will usher in the beginning of a new development paradigm in Africa.

Notes

ⁱThe Asian countries considered are China, South Korea, Philippines, India, Indonesia, Malaysia and Thailand.

ⁱⁱThe years 2000s are extended through 2012 to include the most-up-to-date data in this study.

ⁱⁱⁱData from Nigeria were collected from the African Development Bank Socio-economic database [19].

^{iv}For member states of the West African Economic and Monetary Union, data were unavailable for Côte d'Ivoire and Cape Verde in the WDI database. For other countries in this Union, data show Burkina Faso with the highest rate at 13.4%.

^vThese include as well borrowings from bilateral and multilateral partners - World Bank, International Monetary Fund, African Development Bank, and so forth.

^{vi}This lemma, which is commonly derived and used in the macroeconomics literature, does not depart a great deal from a stylized fact in most developing African countries, as public savings is by and large marginal.

^{vii}The intertemporal Euler Equation is,
$$\frac{(1-\alpha)}{S_t} = \varepsilon R_{t+1} \left[\frac{\alpha}{C_{t+1} - \nu C_t} + \frac{\alpha \nu \varepsilon}{C_{t+2} - \nu C_{t+1}} \right].$$
 It is obtained by deriving $E_t \lambda_t$

from Equation (12) and substituting in Equation (14).

^{viii}These models provide the strongest econometric results with White Noise residuals and lowest AIC and SIC values. Furthermore, approximations methods for all solutions were developed following synthesis presented by [20].

^{ix}For each figure, the third exhibit represents the average percentage increase (or change) in simulated output – above actual output.

^xIn the 2010s, savings exceed investment by about 19 percent for Nigeria. This explains the low average for this country over the entire simulation period.

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Humanities & Social Sciences

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How Teachers Perceive Their Classroom Environments and Student Goal Orientation: a Look into High School Biology Classrooms in Kenya

ABSTRACT

Aims: To examine teachers' and observers' perceptions of classroom climate and goal orientation in high school biology classrooms in Kenya.

Study Design: A mixed design utilizing quantitative and qualitative approach.

Place and Duration of Study: A boys' and girls' boarding high schools in Kenya, observed between May and July of 2010.

Methodology: Participants included 12 biology teachers from two same sex boarding high schools (5 females, 7 males).

Results: Tests of means and t-tests showed that male teachers perceived themselves to be supportive, $t(10) = 3.76$, $p = .01$, $d = 2.201$ and innovative, $t(10) = 2.93$, $p = .05$, $d = 1.882$. Male teachers also reported greater school and classroom performance goals. Observers reported significant differences in the classroom climate and goal orientation, where they saw the girls' classrooms to be more innovative, $t(10) = 5.10$, $p = .01$, $d = 2.125$, high in order and organization, $t(10) = 3.10$, $p = .01$, $d = 2.200$ and affiliation. They also found teachers in the boys' school to be more supportive, $t(10) = 2.41$, $p = .02$, $d = 1.809$.

Conclusion: Male teachers perceive themselves to be more supportive and innovative. Observers see girls' classrooms to be more innovative and well organized.

Keywords: biology classrooms; classroom climate; goal orientation.

1. INTRODUCTION

Teachers do not choose their classrooms. However, they do have control over the kind of classroom climate they construct with their students and the kinds of instructional practices they utilize. The classroom environment shapes teachers' relationships with their students, and students' relationships with each other and with classroom concepts. Teachers often speak of a classroom's atmosphere, tone, ethos or ambience and its importance for student learning [1, 2, 3, 4]. Typically, teachers concentrate almost exclusively on the assessment of academic achievement, and devote little attention to factors which might be related to their students' patterns of adaptive learning and performance. There is research evidence indicating classroom climate to be a factor in the types of goals students establish [5, 3, 6].

1.1 Classroom Climate

Although classroom environment is a somewhat subtle concept, remarkable progress has been made over the last three decades in conceptualizing, assessing and researching it [7, 8, 9]. This research has attempted to answer many questions of interest to educators, such as does a classroom's environment affect goal orientation? Can teachers conveniently assess the climates of their own classrooms? Questions such as these represent the thrust of the work on classroom environments over the past three decades.

Teachers play a vital role in the conceptualization of the classroom climate. They create both the social and physical environments for learning. The very nature of classes, teaching, and students makes a positive classroom climate a critical ingredient of student success [10]. Teachers who are successful in establishing effective classroom climates create more time for learning, involve more students, and help students to become self-managing [11, 12]. A positive learning environment must be established and maintained throughout the year. One of the best ways teachers accomplish this goal is by having a good classroom management plan which includes ways to prevent problems from occurring, having clear rules and procedures, a physical environment that is well organized, ways in which to communicate effectively with students, and how students can interact with each other [10]. According to Doyle [10] classrooms are particular kinds of environments. They have distinctive features that influence their inhabitants no matter how the students or the desks are organized or what the teacher believes about education. Furthermore, classrooms are

multidimensional, they are crowded with people, tasks, and time pressures, have people with differing goals, preferences and abilities, inhabitants must share resources, and actions can have multiple effects and influence student participation [10].

The social and physical environment of a classroom can support or interfere with student learning and well-being. Therefore, teachers carefully plan and create appropriate and effective classroom climates. There is empirical evidence that shows teachers' perceptions of classroom climate differ based on subject matter [1,7,13]. Teachers' perceptions of science classrooms have produced mixed results in terms of classroom climate, with some studies finding teachers' perceptions of science classrooms to be high in competition and low in affiliation [14,8], whereas other studies show teachers' perceptions of science classrooms to be low in cooperation and cohesion [15,2]. However, recent research has revealed a wide variety of science classroom climates, with this diversity based on the teacher's teaching style [16, 4, 17].

1.2 Goal Orientation

Does a subject-specific climate influence the learning goals that teachers structure in their classrooms? Recent research on classroom climate has focused on the classroom instructional goals that teachers establish. Teachers' perceptions of the fit between their classroom environment and their goal orientation are important for the learning outcomes. A goal is an outcome or attainment an individual is striving to accomplish [18]. Goal orientation refers to a pattern of beliefs about goals related to achievement in school. Goal orientations include the reasons teachers pursue goals and the standards they use to evaluate progress toward those goals. There are four main goal orientations: mastery (learning), performance, work-avoidance, and social [19]. For the purposes of this research, only three goal orientations will be utilized. Mastery-approach goal orientation refers to the need to improve and focuses on learning, understanding, and developing competence in academic situations [20, 21, 22, 19]. Students with a mastery goal are concerned about the task itself instead of their self-presentation compared to others. Their evaluation for goal progress is intrapersonal in that their success is based on the improvement of competence and the mastery of the material. For these students setbacks or even failures are not threatening [22].

Performance-approach goal orientation refers to both the need for improvement and a fear of failure, and a focus on demonstrating and validating one's competence [23, 24]. Performance approach goal orientated individuals, are mainly concerned about their self-presentation compared to others. They use interpersonal standard to evaluate their performance in that their success is determined with other people as referents. Demonstrating competence, outperforming others and garnering favorable judgments are signs of success and meeting goals. For these students, their ability is constantly on the line. Setbacks and especially failures are threatening and suggest a lack of ability [25]. Performance approach goals may sound quite negative. Earlier research indicated performance goals generally were detrimental to learning, but current research suggests that a performance goal orientation may not be all negative. In fact some research indicates that both mastery and performance goals are associated with using active learning strategies and high self-efficacy [20, 26, 25]. Performance-avoidance goal orientation refers to a fear of failure and a focus on masking incompetence; in other words, performance-avoidance oriented students try to avoid being seen as incompetent [24, 27]. Students with performance avoidance goals are typically characterized as having a high fear of failure and low competence expectancies [24]. Thus, they are likely to orient themselves towards the possibility of failure and are highly sensitive to information suggesting anticipated failure [24,19].

1.3 Classroom Climate and Goal Orientation

Goal theory researchers have found a relationship between teachers' goal orientation and their classroom climate [28,29,17]. Furthermore, goal theory leads us to expect that instructional practices and the nature of educational tasks and assignments that teachers design can pull for either mastery or helpless motivational patterns that have profound influence on student achievement. In other words, the goal orientation of classrooms influences whether students will pursue learning goals (mastery orientation) or performance goals (ego orientation). Mastery goals, in the United States, are associated with achievement, better academic coping, and positive affect towards school while performance goals are associated with deterioration of performance, impaired academic coping, negative affect and disaffection from school [30, 31, 14, 5, 32, 33, 34, 35]. However, recent research indicates that performance goals may not be bad all the time. This research indicates that both performance and mastery goals are associated with high achievement and efficacy [20,25].

Dweck and Leggett [36] defined two major kinds of goal orientations: performance goals and learning goals. Individuals with a performance goal orientation seek to maximize favorable evaluations of their ability and minimize negative evaluations of ability. Questions like, "Will I look smart?" and "Can I beat others?" reflect performance goals. In contrast, with a learning goal orientation, individuals focus on mastering tasks and increasing competence at different tasks. Questions such as "How can I do this task?" and "What will I learn?" reflect learning goals. Nicholls and his colleagues [37] described two similar achievement goal orientations; they used the terms ego-involved goals and task-involved goals, e.g. [37]. Classroom environments that were high on task involvement and innovation had students with mastery goal orientations, whereas classroom environments that were high on competition had students with performance goal orientations [38]. Teachers who embrace mastery goals are more likely to maintain positive learning environments [39, 40, 17].

Researchers studying goal orientation have focused primarily on academic outcomes. Recently, however, scholars have become interested in ethno racial differences. In their study of eighth grade African American and White students, Freedman, Gutman and Midgley [41] found that African American students espoused personal mastery goals and extrinsic goals significantly more than did White students, suggesting cultural differences in student goal orientation. Similar studies have established an interaction between performance-approach goals and race in predicting the use of self-handicapping [42,43,21], and the role of academic self-efficacy in mediating the relations between performance-approach outcomes [17, 44]. These studies indicate the importance of conducting studies in other cultures before reaching concrete conclusions.

Whereas a vast research literature exists on the influence of classroom climate on goal orientation and learning outcomes, these studies have been largely conducted in the United States and Europe. Indeed few studies have investigated the nature and influence of classroom climate and goal orientation in African cultures [45,46]. Research in the United States and Europe has established that teachers' perceptions of classroom climates and students' patterns of adaptive learning vary between urban and rural schools [47, 48, 49, 35, 50, 51]. Gender and ethnic differences have also been established, suggesting a possibility of cultural differences in classroom environments and goal orientation [32,40]. However, these findings cannot be generalized to other cultures.

Teacher practices most likely reflect the values and beliefs of the larger culture they live in. Glover and Law [52] found a strong link between school culture, teacher practices, and the learning experiences of students. As revealed in the macrosystem, the uttermost level of Bronfenbrenner's model, society's cultural values, laws, customs and resources significantly affect the activities and interactions of its members [53]. For example, studies on child rearing practices reveal that even though authoritative child rearing has advantages across cultures, ethnic groups often have distinct child-rearing beliefs and practices. Some involve variations in warmth and making demands that are adaptive when viewed in light of cultural values and family circumstances [54]. These cultural variations remind us that just like parenting practices, teacher practices such as the conceptualization of their classroom environments and goal orientation can be fully understood only in their larger ecological context.

This study investigated teachers' and observers' perceptions of the nature of classroom climates and goal orientation in biology high school classrooms in Kenya. The following research questions were addressed: How do teachers perceive the classroom climate in their biology classes? Are there school and gender differences in the teachers' perceptions of the classroom climate and goal orientation? Do teachers and observers perceive the classroom climate and goal orientation in biology classes similarly?

2. METHODOLOGY

2.1 Participants

Participants included 12 teachers who taught tenth- and eleventh-grade biology classes of two boarding high schools in Kenya. Five of the teachers were from a boys' school (2 females and 3 males) and 7 from a girls' school (3 females and 4 males). Professional experience ranged from 2 to 12 years. Both schools are national schools, admit only high ranking students -those who score 350+ out of 500 points on the eighth grade national examination [55]. Teachers in both schools are all graduates from either one of the two main teacher-training national universities in the country. (Note: Except for few cases, majority of the high schools in Kenya that admit students who pass the eighth grade national examination are same sex boarding schools. This is typical of the Kenyan education system). The average class size for both schools was 45. The size of the schools ranged from 980 to 1,120 students. Biology was chosen for this study because it is a required course for all high school students.

2.2 Procedures

Participation in this study was voluntary; research information and purpose was sent to all biology teachers in both schools requesting their participation prior to data collection. Data was collected from multiple sources using self-report and direct observation measures during the second term (May–July) of the school year.

2.2.1 Construct validity

Prior to the visit, the Classroom Climate Questionnaire (CCQ; [9,56] and Patterns of Adaptive Learning Scales (PALS; [43,42] were sent to two volunteer teachers from each of the schools where the project was conducted. The teachers (4) were asked to examine the validity of the items by pointing out any terms that might be confusing or misunderstood. The volunteer teachers were recruited via e-mail and personal phone calls. All four teachers identified two terms that may mean something different in the Kenyan context on the PALS and gave suggestions for changes. In their view, “smart” meant dressed up, and “dumb” meant hard of hearing. Therefore, “smart” was replaced with “bright” and “dumb” was replaced with “stupid”. To control for possible bias, these four teachers did not participate in the final study.

2.3 Measures

2.3.1 Teacher surveys

All of the teachers completed the two surveys (CCQ and PALS). The surveys were administered in English. (Note: English is the main language of instruction in the Kenyan schools, starting in third grade). The teachers responded to the surveys in their free time and returned them to the researcher upon completion. It took approximately 10–15 minutes to complete each survey.

2.3.2 The classroom climate questionnaire (CCQ)

This 54-item instrument adapted from the student survey [57] was developed by Trickett and Moos [9,56] to assess three underlying sets of classroom dimensions in junior high school classrooms: Relationship, Personal Growth, and System Maintenance and Change. The Relationship dimension identifies the nature and intensity of personal relationships within the environment and assesses the extent to which teachers and students are involved in the environment and support and help each other. The Personal Growth dimension assesses basic directions along which personal growth and self-enhancement tend to occur. The System Maintenance and Change

dimension assesses the extent to which the environment is orderly, clear in expectations, maintains control, and is responsive to change.

Under these three dimensions are nine specific subscales (the original alphas from Trickett and Moos' study of [9] appear here): (a) Involvement (e.g., "Students put a lot of energy into what they do in this class", $\alpha = .60$); (b) Affiliation (e.g., "Students enjoy helping each other with homework in this class", $\alpha = .59$); (c) Teacher Support (e.g., "I take a personal interest in students in this class", $\alpha = .72$); (d) Task Orientation (e.g., "Students sometimes spent extra time on activities in this class", $\alpha = .36$); (e) Competition (e.g., "Some students try to see who can answer the questions first", $\alpha = .65$); (f) Order and Organization (e.g., "Activities in this class are clearly and carefully planned", $\alpha = .54$); (g) Rule Clarity (e.g., "There is a clear set of rules for students to follow", $\alpha = .49$); (h) Rule Strictness (e.g., "I make it a point of sticking to the rules I make", $\alpha = .45$); and (i) Innovation (e.g., "I like for students to try new projects", $\alpha = .39$). All items are presented in a four-step Likert continuum (e.g., never happens to often happens), with higher scores representing the high end of the scale. This survey has been used in classroom climate studies [57,3,9,56,58] and has proven to be reliable and valid. A test-retest reliability of individual scores on scales, when administered twice with a 6-week interval between occasions, ranged from .83 for Rule Clarity to .95 for Innovation [56].

Traditionally, this survey has been used to assess learning environments mostly in the United States. Therefore, there was a need to determine if the internal consistency reliabilities of the scales in the present study were comparable to the original survey. To this end, the Cronbach's alpha values were calculated for the nine subscales. Reliabilities are presented in Table 1. As seen in Table 1, most of the current study scales' reliabilities were comparable to the original survey. Rule Clarity, Rule Strictness, and Innovation had relatively high reliabilities compared to the original subscales. However, Competition ($\alpha = .36$) and Order and Organization ($\alpha = .34$) had low reliabilities. Teachers had several questions regarding these subscales that could be attributed to cultural differences. For examples, most teachers put question marks or asked the researcher to explain the meaning of the following items: (a) "A student's grade is lowered if he/she gets homework in late" (Note: Because the schools are boarding schools, homework is usually completed during class time); (b) "Students have to work hard for a good grade in this class"; (c) "I hardly ever have to tell students to get back in their seats"; and (d) "Students don't interrupt when I am talking". As several teachers commented, "Isn't that common sense...".

Table 1. Reliabilities for the original and the current study classroom climate subscales

Subscale	Original	Current
Involvement	.60	.86
Affiliation	.59	.58
Teacher support	.72	.63
Task focus	.36	.49
Competition	.65	.36
Order & organization	.54	.34
Rule clarity	.49	.79
Rule strictness	.45	.80
Innovation	.39	.60

Note. Number of items per subscale = 6

2.3.3 Patterns of adaptive learning scales (PALS)

This 22-items survey was developed and used by Midgley et al. [42,43] to assess teachers' perceptions of various constructs associated with students' goal structures. It assesses mastery and performance-approach goal structures at the school and classroom levels. The School Mastery Goals scale (seven items) assesses individual teachers' agreement that the purpose of academic work in the school is to gain mastery over content and to demonstrate student improvement (e.g., "In this school, the emphasis is on really understanding schoolwork, not just memorizing it", $\alpha = .81$). Note: the attached Cronbach's alpha values are from the original scale [42]. The School Performance-Approach Goals scale (six items) assesses teachers' perception of their school's desire for students to appear able and outperform others (e.g., "In this school, students hear a lot about the importance to getting high test scores", $\alpha = .70$).

The Classroom Mastery Goal scale (four items) assesses teachers' perceptions of whether the purpose and meaning of academic tasks and achievement emphasized in their classes focuses on student improvement and mastery (e.g., "In my classroom, I consider how much students have improved when I give them report card grades", $\alpha = .69$). The Classroom Performance-Approach Goal scale (five items) assesses teachers' perceptions of whether their classroom academic tasks focus on competition and ability (e.g., "In my classroom, I display the work of the highest achieving students as an example", $\alpha = .69$). All items are presented in a five-point Likert-type format (strongly disagree to strongly agree), with higher scores representing the high end of the scale. The scale has been used in several studies [48]; [43]; [42] which have proven its reliability and validity. Reliabilities of the subscales in the present study were reasonable (Table 2).

Table 2. Reliabilities for the original and current study patterns of adaptive learning scales

Scale	# of Items	Original	Current
<u>Perceived School Goals:</u>			
Mastery	7	.81	.53
Performance- Approach	6	.70	.51
<u>Perceived Classroom Goals:</u>			
Mastery	4	.69	.61
Performance-Approach	5	.69	.60

2.3.4 Classroom observations

Prior to data collection, a team of graduate students received a 2-day mandatory training of classroom observations. Several observations (ranging from 6–8) were made for each of the twelve teachers, with approximately six observations per teacher, spread over the second term (May–July) of the school year. At least two graduate students observed each classroom at the same time for all the observations used in this analysis. Observation time ranged from 40–80 minutes. Observers used two observation forms: the Classroom Climate Observation Form [57] and the Patterns of Adaptive Learning: Classroom Observation Form [43,42]. Both observation forms tapped into similar concepts as those of the teachers' surveys. The classroom climate form was developed by the researcher and has been used in previous research with reasonable reliability [57,3], and the patterns of adaptive learning was developed and used by Midgley et al. [42,43]. They were on a four-point Likert-type format, with space provided at the bottom for observer comments. Using Cohen's Kappa statistic, an inter-rater agreement beyond chance was established at 0.95.

3. RESULTS

3.1 Teacher Survey Data

A preliminary analysis was conducted to determine if there were differences among dependent measures by the length of teaching experience. No significant differences were found. Some of the teachers taught more than one class and grade. There were a total of twenty classes (11 from the boys' school and 9 from the girls' school). Some teachers taught both grades 10 and 11. Therefore, a second preliminary analysis was conducted on the teachers' data to determine if there were differences among the dependent variables by class and grade. No class and grade differences were evident. Consequently all the classes and the two grades were combined in subsequent analyses.

Note: Cohen's *d* was used to calculate effect sizes.

3.1.1 How do teachers perceive their classroom climate?

Two t-tests were conducted on the classroom climate variables to examine how teachers perceived their classrooms. The first test examined the nine classroom climate variables with school as the independent variable. No significant effects were found. The second analysis examined the classroom climate measures with gender as the independent variable. This test revealed significant effects between male and female teachers on Teacher Support, $t(10) = 3.76$, $p = .01$, $d = 2.201$ indicating that the male teachers perceived themselves as being more supportive of their students compared to the female teachers. In addition, male teachers saw their classrooms as being more innovative compared to female teachers, $t(10) = 2.93$, $p = .05$, $d = 1.882$. There was no significant interaction effect between school and gender on classroom climate variables. See Table 3 for all the means and standard deviations for the classroom climate measures.

Table 3. Overall means and standard deviations for classroom climate for male and female teachers

Subscales	Females		Males		Sig.
	Mean	SD	Mean	SD	
Involvement	3.17	.66	3.45	.52	n.s
Affiliation	3.43	.32	3.69	.35	n.s
Teacher support	3.17	.24	3.64	.20	.01
Task focus	3.57	.25	3.59	.36	n.s
Competition	3.03	.14	3.31	.42	n.s
Order & Organization	3.17	.39	3.31	.24	n.s
Rule clarity	3.30	.96	3.59	.33	n.s
Rule strictness	2.70	.83	3.29	.38	n.s
Innovation	2.60	.56	3.36	.49	.05

Note. Mean range: Low=1.0, High=4.0; Males: N= 7, Females: N=5

3.1.2 What are teachers perceptions of their school and classroom goal orientation?

Descriptive statistics were conducted to determine what types of goals teachers report on the PALS subscales. Overall, teachers reported greater school and classroom structured performance-approach goals. Tests of means revealed a significant difference between male and female teachers' perceptions of their school performance goals, $t(10) = 2.98$, $p = .05$, $d = 1.874$ and classroom performance goals, $t(10) = 3.12$, $p = .05$, $d = 1.964$. Compared to female teachers, male teachers perceived their school to be encouraging performance approach goals. Similarly, they perceived their classrooms to be encouraging performance approach goals. See Table 4 for all means and standard deviations. Tests of means revealed no statistical difference

between the two schools. In addition, there was no significant interaction between school and gender on goal orientation.

Table 4. Overall means and standard deviations for goal orientation based on gender

Scales	Females		Males		Sig.
	Mean	SD	Mean	SD	
School Performance Approach	4.13	.36	4.82	.37	.05
School Mastery goals	4.26	.27	4.29	.61	n.s
Classroom Performance Approach	3.64	.26	4.46	.70	.05
Classroom Mastery goals	3.45	.62	3.62	.72	n.s

Note. Mean range: Low=1.0, High=5.0; Males: N= 7, Females: N=5

3.2 Classroom Observations

Only observations that were made by two observers at the same time were used for analysis. After establishing an inter-rater reliability at 0.95, only one observer's ratings for all the twelve teachers were used for analysis. Seventy-two observations were analyzed, with six observations per teacher. All observations conducted by the same observer were combined to provide multiple samples of data for each teacher which could then be averaged as a general profile of the teacher's classroom climate and goal orientation according to the subscale ratings. Descriptive statistics and independent t-tests comparing schools, gender and grades were conducted on the data.

3.2.1 What are observers' perceptions of the classroom climate in biology classes?

Preliminary analyses exploring class and grade-level differences in observers' survey reports revealed no statistically significant effects. Therefore, class and grade were not included in subsequent analyses.

From the overall descriptive statistics, observers saw classroom climates conducive to high student involvement and task focus and with highly supportive teachers. Teachers were also observed to make clear rules and to be strict in enforcing these rules. See Table 5 for all means and standard deviations.

Table 5. Overall means and standard deviations for classroom climate based on observation data

	Overall		Boys' School		Girls' School		Sig.
	Mean	SD	Mean	SD	Mean	SD	
Task Focus	3.63	.27	3.55	.27	3.70	.24	n.s
Teacher Support	3.45	.32	3.60	.31	3.30	.25	.05
Rule Strictness	2.50	.00	2.50	.00	2.50	.00	n.s

Rule Clarity	2.50	.00	2.50	.00	2.50	.00	n.s
Innovation	2.22	.52	1.83	.18	2.60	.31	.01
Student Involvement	2.01	.29	1.90	.16	2.21	.35	n.s
Affiliation	1.85	.73	1.50	.40	2.20	.82	.05
Order and Organization	1.55	.53	1.25	.42	1.85	.47	.01

Note. Mean range: Low=1.0, High=4.0; boys' school: N=5, girls' school: N=7. Values are based on 6 observations per teachers (total = 72 observations)

Tests of means were conducted to examine whether observers reported significant differences in the classroom climate between the schools and the teachers' gender. The first t-test revealed significant school differences in the classroom climate on Innovation, $t(10) = 5.10$, $p = .01$, $d = 2.125$ with the boys' school teachers' classrooms being perceived as more innovative; Order and Organization, $t(10) = 3.10$, $p = .01$, $d = 2.200$ with the girls' school teachers' classrooms being reported as more organized; Teacher Support, $t(10) = 2.32$, $p = .03$, $d = 1.988$ with the boys' school teachers being perceived by observers as more supportive of their students; Affiliation, $t(10) = 2.41$, $p = .02$, $d = 1.809$ with the girls' school classrooms being perceived as more friendly compared to the boys' school's classrooms. No significant gender differences were found.

3.2.2 What are observers' perceptions of goal orientation in biology classrooms?

Descriptive statistics conducted on the patterns of adaptive learning classroom observations showed class activities to be carefully planned. Observers noted that teachers stayed on task and covered the amount of material intended to be covered during class time, and they (teachers) also checked to see if students understood the material being covered. Rarely did observers see students being recognized for their work or emphasis being placed on trying hard and making learning fun. Observers reported few incidences where students worked in collaborative groups. All observers marked "N/O-Not Observed" against the items examining the teacher's authority. The items were (a) "The teacher is consistent in dealing with students who break rules", and (b) "The teacher explains what the rules are and enforces them if necessary". Table 6 reports all means and standard deviations.

Table 6. Overall means and standard deviations for goal orientation based on observations

Subscales	Overall		Boys' School		Girls' School		Sig.
	Mean	SD	Mean	SD	Mean	SD	
Task	3.21	.33	2.78	.35	3.60	.24	.01
Time	2.50	.14	2.50	.00	2.50	.19	n.s
Evaluation	2.16	.43	2.11	.27	2.20	.50	n.s
Social	1.71	.26	1.50	.22	1.85	.27	.05
Grouping	1.67	.23	1.00	.34	1.05	.25	n.s
Help-seeking	1.60	.56	1.61	.57	1.60	.58	n.s
Messages	1.38	.31	1.61	.22	1.65	.38	n.s
Recognition	1.25	.39	1.22	.45	1.20	.39	n.s
Authority	1.00	.00	1.00	.00	1.00	.00	n.s

Note. Mean range: Low=1.0, High=4.0; boys' school: N=5, girls' school: N=7. Values are based on 6 observations per teachers (total = 72 observations)

To examine whether the means were significantly different, tests of means were conducted with the goal orientation measures as dependent variables and school and the teacher's gender as independent variables. The first test of analysis examined the four goal orientation measures with school as the independent variable. Significant effects were found for Task Focus, $t(10) = 4.29$, $p = .01$, $d = 2.210$ with the teachers in the girls' school's classrooms being perceived by observers as more task oriented. The classrooms of the teachers in the boys' school were perceived as significantly social, $t(10) = 2.54$, $p = .02$, $d = 2.005$ compared to the girls' classrooms. The test of means by gender did not reveal any significant effects for the goal orientation as reported by observers.

4. DISCUSSION

The aim of this study was to examine teachers' perceptions of their classroom climate and goal orientation in high school biology classes. Teachers from the two schools did not differ significantly in their perception of their classroom climate. All the teachers saw their classes as being high in task focus, student involvement, affiliation, and order and organization. This perceived similarity could be due to the fact that the two schools are boarding, all the teachers are trained at either one of the two main teacher training universities, the curriculum is centralized across schools in the country, and all students wear uniforms [55]. For example, during the second term of the school year (the period of observations), all the tenth grade teachers in both schools were teaching about "pollination" and "human reproduction", while all the eleventh grade teachers were teaching about "gaseous exchange" and "immunity and the immune response in humans".

However, when the classroom climate was assessed by the teachers' gender, a significant difference emerged. The male teachers from both schools saw themselves as being more supportive of their students compared to the female teachers. This finding was surprising. Since the two schools are boarding, students are away from their parents for nine months per year and teachers act as "surrogate parents" we expected no significant difference in the teachers' perceptions of their support for their students. More research is needed to further explain and understand this finding. Male teachers also perceived their classroom climate to be high in innovation.

Results on goal orientation revealed all teachers perceive their schools' and classrooms' practices as more performance focused. However, male teachers reported significantly high school and classroom performance-focused practices. The fact that male teachers perceived their classrooms to be high in teacher support and innovation and also reported high performance-focused practices is contrary to the findings from [36] and [38] studies which found that classroom climates that were high in task involvement and innovation led only to mastery-focused practices and goals. It is likely that teachers' perceptions of environmental goal structures are partially influenced by their existing goal orientations. As Pintrich [33] study in the United States found, if teachers believe that there is an emphasis on competition and demonstrating ability, these beliefs should affect their own motivation and classroom practices.

The other possible reason for these teachers' inclination to performance-focused practices could be the nature of the education system in the country. The Kenyan education system is examination oriented. The centralized national examinations for twelfth graders are quite intense. Eleventh-grade students start preparing for the national examination in January, the beginning of the year. Eleventh-grade teachers spent a considerable amount of time reviewing past examination questions with their students. Bear in mind that all but two of the teachers participating in this study taught at least one eleventh grade class. Teachers whose students perform well are publicly recognized by the school and sometimes given awards. In addition, the government, through the Ministry of Education, publicly announces and publishes the top ten schools. Plus, this national examination is the single determinant to college or university [55]. It is therefore safe to say that the academic practices that these teachers report are emphasized within the societal context and also relate to their own perceptions of the academic goal orientation emphasized in the school context. As Ames [30] and Midgley et al. [29] reported, practices such as public honor rolls or special

privileges based upon academic standing send important messages to teachers and students regarding what constitutes success in a given school. Likewise, the results from this study support classroom climates being a reflection of cultural contexts.

In the past, research has found that those in positions of power, in this case teachers, perceive environments they are in more positively than those not in positions of power [56,57,3]. Contrary to these findings, teachers and observers in the present study viewed the classroom climate similarly. Like the teachers, observers reported more student involvement, high teacher support, positive student-student interactions, clear classroom rules, and hardly any disruptive incidences. The observed classroom environment enabled teachers more time to devote to student learning. However, when the two schools were compared statistically on classroom climate, significant differences emerged on innovation, order and organization, teacher support, and affiliation. Observers noted that in the girls' school, the teachers were more innovative and organized, and students were friendly towards each other. On the other hand, teachers in the boys' school were observed to be more supportive of their students. This finding was quite unexpected. Further research investigating teachers' perceptions of their support for their students in same-sex schools is warranted. In addition, future research conducted with students and teachers to assess their perception of classroom climate would be helpful.

On the patterns of adaptive learning, observers just like the teachers, reported high task focus; teachers stayed on task and made sure that the amount of material to be covered was covered during the allotted class time. Teachers consistently checked to make sure their students understood the material being completed. However, significant differences regarding task focus were found between the two schools. In the girls' school, observers reported significantly more task focus in the classrooms compared to the boys' classrooms. In addition, observers noted high positive student-student interactions in the girls' school. It appears that students engage in more positive interactions in the girls' classrooms.

In both schools, observers noted that teachers rarely recognized students for their work or class participation. In the same vein, hardly any emphasis was placed on making learning fun. The only work displayed in the classrooms were science related posters, a class time table, and a schedule of after-class activities. In addition, there were few incidences of collaborative group work during class. This is interesting since science classrooms in the US and Europe have been shown to regularly have

small group-based experiments [1, 8]. It appears as though the teachers in this study emphasize mastery of content more than critical thinking skills and inquiry learning that is usually embedded in active student-student interactions or small groups' activities.

The teacher's authority was apparent. Students sat in rows facing the teacher, did not get out of their seats nor talk without the teacher's permission. All classrooms appeared to be well-managed with clear rules and the greatest emphasis placed on covering the material intended to be covered during class time. The overriding element was task focus regardless of the grade, gender, class, or school. It was no wonder that observers consistently checked "N/O-Not Observed" on items inquiring about the teacher's authority.

This study had some limitations. The sample of teachers included in this study was limited to 12 teachers and thus restricted higher level statistical analyses. This calls for caution in interpreting the findings. In addition, these teachers were in same-sex boarding schools, therefore, the results may not generalize to all high school biology teachers. Furthermore, this study did not collect data on the students in these teachers' classrooms to examine their perceptions of classroom climate and goal orientation. In addition, the reliabilities, particularly those of the classroom climate scale, were generally low. This could be attributed to the cultural differences where some of the items might have been interpreted differently.

5. CONCLUSION

In conclusion, the study findings from teachers and observers reveal positive classroom environments that are high on task focus and high performance-focused practices at both the classroom and school level. Previous research in the United States examining classroom climates and goal orientations has reported a positive correlation between positive classroom climates and mastery goals [30,31,38,17]. Kaplan and Maehr [32] for example, found mastery-focused practices to be associated with positive outcomes, whereas performance-focused practices were associated with negative outcomes. Importantly, these studies do not explicitly include aspects of culture or perhaps the interpretation of goal orientations by different cultures. Given that the definition of a mastery goal centers on learning, understanding, and improvement, it is likely that culturally valued activities that reflect this goal are necessary, if not sufficient, for the creation of a meaningful goal orientation. The two schools in the present study are among the top national schools in the country

[55]. If the primary objective of students, teachers, and administrators is to perform better on the national examination, it is unlikely that they would focus on activities that do not meet this end. In this study, performance-approach goals could be defined as “learning” due to the nature of Kenya’s national testing protocol. This finding supports current research in goal orientation that indicates performance goals to be associated with high achievement and self-efficacy [20, 26, 25].

ACKNOWLEDGEMENTS

We would like to thank all the teachers who participated in this study. Thank you also for allowing us to come into your classrooms to observe.

COMPETING INTERESTS

We, the authors have no competing interests that could potentially bias our work.

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The Importance of Global Citizenship to Higher Education: the Role of Short-Term Study Abroad

ABSTRACT

An increasing number of institutions actively promote *internationalisation* as a key strategy, implying that the development of a "global citizenry" is an integral part of their educational mission. To fulfil this strategy, four constructs must be addressed: (1) what is global citizenship? (2) why is global citizenship important? (3) how do we measure global citizenship?, and (4) how do we foster global citizenship? (1) Although global citizenship is a highly contested and multifaceted term, three key dimensions are commonly accepted: social responsibility, global awareness, and civic engagement. (2) Today's graduates are critically dependent on an interconnected world, and universities have a responsibility to promote global mindedness, to provide greater employment opportunities for their graduates, and to respond to political calls for enhanced national security. (3) There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing the three previously consented upon tenets of global citizenship, Tarrant (2010) developed a Value-Belief-Norm model to assess global citizenship. (4) A number of nations are utilizing international education as an *en masse* mechanism for nurturing global citizenship. However, the "just do it" model may be ineffective. Conversely, short-term courses, coupled with action-oriented experiences that encourage reflection, critical analysis, and synthesis may be effective catalysts. Since short-term programs are likely to remain the only realistic

option for many undergraduate students, there is a growing need to document whether short-term courses can promote higher-order outcomes and, if so under what conditions.

Keywords: critical reflection; transformative learning; experiential education; internationalization; globalization.

1. INTRODUCTION

Institutions of higher education arguably have a responsibility to develop curricula that foster "global citizens", either as a consequence of their educational mission, in response to political calls for enhanced national security and global awareness, or in strengthening the employability of their graduates within an ever-globalizing context. To fulfil this strategy, four constructs must be addressed: (1) what is global citizenship? (2) why is global citizenship important? (3) how do we measure global citizenship? and (4) how is global citizenship fostered? In addition to discussing these questions, commentary will focus on the pivotal role short-term study abroad programs can play in fostering global citizenship.

2. WHAT IS GLOBAL CITIZENSHIP?

Although global citizenship is a highly contested and multifaceted term [1,2], three key dimensions, at least within the study abroad literature, are now commonly accepted [3,4]: (1) social responsibility (concern for others, for society at large, and for the environment), (2) global awareness (understanding and appreciation of one's self in the world and of world issues), and (3) civic engagement (active engagement with local, regional, national and global community issues). In one of the most thorough reviews of the global citizenship concept in the study abroad scholarly field, Schattle [4] proposes that it "entails being aware of responsibilities beyond one's immediate communities and making decisions to change habits and behavior patterns accordingly" (p. 12).

Outside the study abroad literature, there is consensus that the natural and built environment is the context in which global citizenship can be best understood [5-8], since environmental concern not only benefits others beyond the individual, but also invokes a sense of obligation toward others. According to Dobson [7], the environment constitutes a *community of obligation* in which social responsibilities and behaviors

extend, in the form of an ecological footprint. In distinguishing between a Good Samaritan (i.e., based on charity) and a Good (*Earth*) Citizen (i.e., based on obligations), Dobson argues "the idea of the ecological footprint converts relationships we had thought to be Samaritan into relationships of citizenship" (p. 105). Citizens, then, are not merely global by reason of their international travel, but as a result of their pro-environmental behaviors that make a sustainable impact. Similarly, Attfield [5] suggests, "environmental responsibilities form the most obvious focus of concern for global citizens, as well as the territory where global obligations most clearly arise" (p. 191). In a similar vein, Winn [8] considers the concept of global citizenship to include "behaviors associated with the global issues of environmentalism, social justice, and civic participation" (p. 124). With the ever increasing role of higher education institutions in the development of global citizens, a specific emphasis on internationally located educative experiences, coupled with critical reflection methods, and ultimately framed by relevant disciplines, the behaviors and actions of globally educated citizens can and should be developed. Moreover, it is the students' exploration and application of pro-environmental behaviors within the natural environment, the built environment, and the communities they engage.

3. WHY IS GLOBAL CITIZENSHIP IMPORTANT?

Universities and colleges arguably have a responsibility to develop international curricula that foster a student citizenry with stronger global awareness, either as a consequence of their educational mission [1,4,9-11], in response to political calls for enhanced national security [12-14], in providing greater employment opportunities for their graduates [15], or simply in heeding the public's growing interest in the importance of promoting global mindedness among future generations [16]. Responding to these realities requires a massive increase in the global literacy of the typical college graduate.

The intensification of and access to technology has forged links between institutions, societies, cultures and individuals, and today's university graduates live and work in a world that is more accessible than ever before [17]. While the availability of modern travel and technology is not accessible to all of earth's 7 billion 'citizens', those who have access and acceptance into higher education institutions also have

greater opportunities for globalized experiences. The opportunity for a student to frame their existence within a global context can promote deeper understanding of cultural differences and provide a counterpoint for juxtaposing their personal beliefs with those of others. Internationalization and globalization are fundamental components of the learning process; to live and reflect upon the experiences a student has with these phenomena can increase action and bring about transformation of perspective.

4. HOW IS GLOBAL CITIZENSHIP FOSTERED?

There is growing political interest in international education and increasing reference to globalization (and the need to prepare students as global citizens) in the missions of academic institutions [10]. Lutterman-Aguilar and Gingerich [18] argue that education abroad can effectively prepare students as responsible global citizens if programs incorporate the principles of experiential education, notably action-oriented experiences that encourage reflection, critical analysis, and synthesis. Similar conclusions are drawn by McLaughlin and Johnson [19], who propose a field-based experiential learning model for short-term study abroad programs. This model enables students to move beyond knowledge learning to application and integration, toward a real, "unbuffered" world. Indeed, there is strong evidence throughout the study abroad literature supporting the integration of experiential learning as a key medium for promoting higher-order learning [20-28].

The outcomes of study abroad experiences, students' previous experiences with the course material, the destination, and travel in general can have an influence on the potential shift in a student's worldview. McKeown [29] recognized the profound change in students' values when experiencing a new social environment that called into question their internal beliefs [30] and referred to this as the *first-time effect*. This phenomenon has also been recognized in other learning environments where experientially based pedagogy (service-learning, problem-based learning) has been utilized and experienced for the first-time [31,32]. Valuable to the student experience, their engagement, and the likelihood of a shift in worldview are the following: faculty-student engagement, experiential learning opportunities, dialogue and group discussions focused on students' experiences, and reflection assignments connected to experiences and readings [33]. Within study abroad experiences,

exposure to new places, cultures, and learning environments where a student's preconceived and established notions and beliefs are tested, may act as the catalyst or impetus to bring forth a transformative experience. Of particular importance is the creation of moments of critical reflection and discussion. In these types of environments, exposed to realities that are outside their previous understanding or comfort zones, the learner may discover a need to acquire new perspectives in order to gain a more complete and complex understanding. A deeper, more sincere understanding of reality and how their perception of reality is framed by their worldview, is the value in combining experiences with critical analysis, reflection, and abstract conceptualization [34].

5. HOW IS GLOBAL CITIZENSHIP MEASURED?

There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing this context, Tarrant [30] developed a Value-Belief-Norm model to assess global citizenship and the "added value" of study abroad (Fig. 1). In Tarrant's [30] conceptualization of a framework for exploring the role of studies abroad education and global citizenship development, he posited a frame based on Stern's [35] Values-Beliefs-Norm theory (VBN). In this, Tarrant identifies two components based on (1) an awareness/belief that specific environmental conditions threaten or have adverse consequences for the things the learner values and (2) an awareness/belief that the individual/learner can act to reduce the specific threat(s) [30,35]. These components and the extent to which an individual learner aligns with these two beliefs are critical to the conceptual framework Tarrant puts forth.

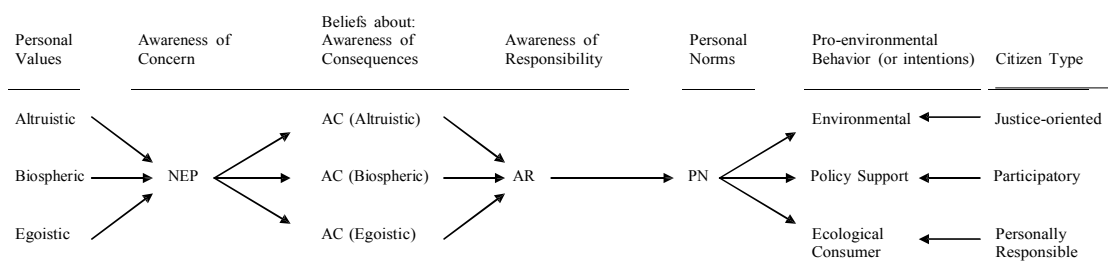


Fig. 1. Adapted value-beliefs-norms theory of global citizenship [30]

The recognition of critical reflection as an integral component of the conceptual framework offered by Tarrant [30] is evident in Westheimer and Kahne's [36] "citizen-type" and Dobson's [7] "Earth Citizen". For example, Westheimer and Kahne [36] argue that a justice-oriented citizen is one who is concerned with asking questions about issues she or he sees in their community (local and global) and then acting upon the answers they find. This is in sharp contrast to a personally responsible citizen who is typically concerned with acting responsibly or volunteering in times of crisis. Interestingly, it seems that a clear difference between these two citizen types is found in the citizen's concern with or interest in critical reflection upon their observations and experiences. Justice-oriented citizens seem to be more concerned with asking the more complex questions versus accepting the simpler answers. By asking more complex questions, it is assumed that justice-oriented citizens are analyzing, considering, and reconsidering their perspectives and beliefs in light of new information and experiences. This is primarily a function of critical thinking and reflection. That is, being prepared to ask and answer the complex questions that emerge from our continually evolving and complex society [28]. Doing this may promote and nurture "change in environmentally oriented values, norms, and behaviors" [30]. This observation is demonstrated further by Dobson's view of an Earth Citizen. With an Earth Citizen there tends to be less emphasis on volunteerism as ends unto itself, and a greater emphasis placed on questioning what is observed or has come to be known and then this is acted upon in order to ameliorate the causes of observed injustices. Overall, the conceptual framework "proposes that values and worldviews act as filters for new information in the development and formation of congruent beliefs and attitudes which in turn predispose behavioral intentions and ultimately pro-environmental behaviors" [30].

The two components Tarrant identified (the connection between environmental conditions and the threats on a learner's values and the belief that the learner can reduce the threats), which underpin Fig. 1, have a common denominator. That denominator is a learner's values and what they are willing to do about those values. The measurement of value identification or awareness is a complex, but important endeavor. One particular theory that has been operationalized and empirically tested to measure a person's values is the Schwartz norm-activation theory. Norm-activation theory states that "pro-environmental actions occur in response to personal moral

norms about such actions and that these are activated in individuals who believe that environmental conditions pose threats to other people, other species, or the biosphere and that actions they initiate could avert those consequences" [37]. One salient, empirical study measured the values associated with social movements particularly in context of pro-environmental actions. In the Stern et al. [37] study, which was designed to measure two variables from Shwartz's norm-activation theory (personal norms and awareness of consequences), resulted in findings that were strongly consistent with the VBN theory. Essentially, it was determined that personal norms were strongly associated with the behaviors of all three types of nonactivist environmentalism, provided the strongest predictor of consumer behavior and willingness to sacrifice, and was the only variable in their study to have a direct effect on all three types of movement support.

A limitation of Tarrant's model is that it directly focuses on environmental awareness and does not directly address the concepts of social justice or civic engagement, i.e., the key dimensions of global citizenship [3,4]. Although, it should be noted that in Tarrant's conceptual framework, there is indirect or ancillary inclusion of personal values and awareness of responsibility (civic engagement) and the citizen type (social justice orientation) an individual could align. Even though Tarrant clearly is addressing the conceptualization of "pro-environmental behavior" from an environmental perspective, it is inextricably connected to other important elements to be considered when attempting to understanding global citizenship. In addition, the use of Shwartz's norm-activation theory to operationalize and measure global citizenship is an important avenue to consider.

6. WHAT ROLE CAN SHORT-TERM STUDY ABROAD PROGRAMS PLAY?

The past 25 years have witnessed growing numbers of students, particularly in the United States (U.S.), participating in study abroad programs of varying durations, locations, and academic foci. These growing numbers, contextualized and sourced from the U.S. higher education student body, have led to the literature being skewed in context of the U.S. This particular growth and respective body of literature ultimately reflects a U.S. centric perspective on research into the influence of short-term study abroad. This is due to the limited number of empirical studies investigating non-U.S. students studying abroad Curthoys [38]. With this, Europe and Australasia

could be considered emerging markets for future generations of students beginning to study abroad. Further investigation into these emerging markets and the influence of study abroad on participants is necessary.

In the U.S., most recent estimates indicate that of the approximately 270,000 U.S. students who studied abroad for academic credit in 2009/10 (compared to 75,000 students in 1990), the majority (57%) were short-term (summer or 8 weeks or less) [39]. While short-term programs have been criticized for being academically light [29], they appeal to large numbers of undergraduates without prior international travel experience and/or who lack the funds or time for extensive education abroad opportunities [40-43]. Short-term programs thereby may provide a springboard for future, more in-depth travel [44], a pathway for those studying abroad for the first-time [29], and perhaps "the only realistic alternative in terms of the demands of your degree studies and economic resources" [39]. As such, short-term programs may be viewed as crucial for achieving broad and more egalitarian access to study abroad for U.S. undergraduates.

Skepticism has been voiced about whether the short-term study abroad format can offer students a sufficiently profound experience to transform the fundamental values and beliefs that underlie global citizenship. Recent evidence suggests that the duration of the international experience may be only weakly related to student learning outcomes. The large scale Georgia Learning Outcomes of Students Studying Abroad Initiative (GLOSSARI) [45] found a general advantage for study abroad at any duration over no study abroad in terms of graduation rates, although moderate duration (4-8 weeks) exceeded both shorter and longer programs on this variable. In their study of over 6,000 alumni from 20 institutions, Paige et al. [3] suggests no difference in global engagement between students who had studied abroad for shorter versus longer durations. Their findings from the University of Minnesota's Study Abroad for Global Engagement project revealed that students in short-term programs (of 4 weeks or less) were just as likely to be globally engaged as those who studied abroad for several months or longer. Similarly, McKeown [29] posited that, "students who had been abroad for as little as two weeks showed patterns of intellectual development more similar to peers who had been abroad for months or years than to those who had not been abroad at all" (p. 6). The conclusion is that spending at least some time abroad is probably better than no time at all, though the extent to which the "just do

it" analogy [46] holds true for study abroad (i.e., relative to home campus) remains relatively unsubstantiated [29,47]. Meaning, whether studying abroad for a short, moderate, or long-term period, there needs to be some level of consideration for appropriate measures to be implemented that will help students make connections from and sense of their new experiences.

Short-term study abroad, when coupled with an adequate pedagogical framework, could serve as an educative opportunity for fostering transformative learning environments where new experiences and perspective may be developed. It is that critical moment where learners have engaged with something novel, whether it is physical or psychological, that is when reflection and critical reflection become imperative to the learning process. The shift from physical experience to meaning making can be different, but it is imperative for perspective transformation and ultimately behavior adaptation to occur. Though it should be noted that prior to the exposure to something novel, abstract conceptualization can have occurred. Meaning, preparation and study for future experiences related to a student's involvement in a course is also valuable to their learning. These connections between experience and reflection, content and experience, and reflection and content are ones that have long been theoretically [14,34,48] and practically [31] established.

7. DISCUSSION AND DIRECTION

Over the past decade there have been increasing calls to develop the capacity of higher education students, particularly in the U.S., to think and act globally [11]. One method of encouraging the civic of global citizenship is through study abroad [30]. To date, the academic response to calls for greater global learning has focused primarily on increasing quantity (i.e., "just do it"). The number of students participating in education abroad is often the primary indicator of an institution's success in achieving globalization aims [44, 49]. Clearly, a major driver of such efforts should also address quality – the added value and outcomes of studying abroad as indexed by measures more informative than traditional course evaluation responses. As resources become available for study abroad development, funds should be targeted toward programs that promote demonstrable and specific learning outcomes.

Short-term, faculty-led, field-based programs can have an important role in fostering some of the outcomes considered critical to national security, globalization and global competitiveness, and social norms [11,50]. Though not all education programs should be similarly structured, we concur with Lutterman-Aguilar and Gingerich [18] that, "study abroad and experiential education are natural partners because they share the common goal of empowering students and preparing them to become responsible global citizens" (p. 46). Accordingly, we encourage faculty to incorporate field-based learning experiences into study abroad curricula and to consider their role as facilitators of citizen activism [1], promoting opportunities for civic engagement, responsibility, and global awareness. The challenge, clearly, is to develop programs in a measured and effective way. Such programs must be attractive to students (especially for those traveling abroad for the first-time), yet must not turn the travel experience into a token service program of consumerism with little value beyond the tourism dollars it generates [2,51]. Since short-term programs are likely to remain the only realistic option for many undergraduate students and potentially the least expensive medium for democratizing study abroad, achieving such strategies will be critical. In moving toward more robust evidence of the value of education abroad, particularly with respect to globalization, we need to design research that can clearly demonstrate whether studying abroad (relative to home campus) can promote higher-order outcomes (such as global citizenship) and, if so, under what conditions.

Essentially, the literature to date is primarily focused on U.S. students studying abroad [38]. Comparative groups of students are needed to determine the influence study abroad experiences might have on non-U.S. counterparts who are from different geographical and cultural backgrounds. Moreover, this lack of research can be attributed to the emerging market and associated pedagogy of study abroad and international education in countries like New Zealand, Australia, and the United Kingdom.

8. CONCLUSIONS

There is a consensus that the natural and built environment is the context in which global citizenship can be best understood. Utilizing this context, Tarrant [30] developed a Value-Belief-Norm model to assess global citizenship and the "added

value" of study abroad. A number of nations, including the U.S., have witnessed growing political pressure to utilize international education as an *en masse* mechanism for nurturing global citizenship. However, the extent to which the "just do it" analogy holds true for study abroad remains relatively unsubstantiated. Education abroad can effectively prepare students as responsible global citizens, but only if coupled with action-oriented experiences that encourage reflection, critical analysis, and synthesis. Since short-term programs are likely to remain the only realistic option for many undergraduate students, there is a growing requisite to document whether short duration programs can promote higher-order outcomes (such as global citizenship) and, if so, under what conditions. In particular, there is a lack of demonstrable evidence of the *transformational change* attributable to participation in field-based/experiential study abroad programs, relative to (a) other study abroad programs lacking a structured experiential component and/or (b) home campus (i.e., traditional classroom) courses and/or (c) comparisons of the experiences and learning outcomes of students from different countries and cultures.

Although global citizenship is a highly contested and multifaceted term, three key dimensions are commonly accepted: social responsibility, global awareness, and civic engagement. This particular observation lends itself well to the perspective that global citizenship, at its core, is focused on connections – a person's connections with the products they choose to use, the environment they believe they influence, and the groups of people who they directly and indirectly associate with. Whether or not those connections (with products, environments, and people) are recognized and reflected upon is what fundamentally separates those who consciously assume their role as a global citizen from those who do not.

ACKNOWLEDGEMENTS

No sources of funded are reported.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Predicting Intention to Complete and Learning Outcomes in a Sample of Adult Learners

ABSTRACT

Aims: This research investigates the relationship between Self-Esteem and completion/non-completion of tertiary qualifications for a sample of New Zealand adults, and explores the factors that may predict intent and learner outcome for these students.

Study Design: A descriptive and correlational research design.

Place and Duration of Study: Corporate Academy Group, a Private Training Establishment located in a low socio-economic area, Manukau City, New Zealand, between August 2009 and April 2010.

Methodology: The Theory of Planned Behavior was used to assess intent to achieve, and was extended to include the Rosenberg Self-Esteem Scale as a measure of Self-Esteem. Adult students ($n = 211$), 115 females and 96 males aged between 15 and 65, were assessed for intent to achieve and actual outcome (completers vs. non-completers).

Results and Discussion: Participant's reports of attitude, perceived behavioral control and subjective norm, within the Theory of Planned Behavior, sufficiently predicted their intention to complete the course of study, and this prediction was significantly improved with the addition of their reported Self-Esteem level ($P < .05$). Furthermore, Rosenberg Self-Esteem Scale scores successfully predicted actual learner outcome, that is, completion or non-completion of the course, and was the only variable to do so ($P < .05$). Additionally, individual's Self-Esteem levels were found to increase across two measurement points ($t_{(205)} = 4.59$, $p < .01$), upon first enrolment and at the terminus of the training program.

Conclusion: Results indicate the value of using Theory of Planned Behavior and Self-Esteem measures to predict a student's intention to complete their course of study and potentially their successful completion of that

course. These findings offer an opportunity for future research into the prediction of learner outcomes using the Theory of Planned Behavior and Self-Esteem, and the ability of learning establishments to mitigate risk of non-achievement for the adult learner.

Keywords: learner outcomes; adult learner; tertiary education; private training establishment; theory of planned behavior; self-esteem.

1. INTRODUCTION

The present research focuses on the adult learner, defined as anyone over the age of 16 who has left secondary school and is now continuing onto some form of tertiary study, other than that provided by universities or technical institutions. Broadly, these adult learners can be defined as those with no or very low qualification, and who enroll in tertiary courses with a vocational focus on typically low-skill occupations. In the New Zealand context, adult learners are often directed to a Private Training Establishment (PTE), as they do not meet the criteria for enrolment with a polytechnic or university, and can be considered the equivalent of Education Learning Providers in the United Kingdom, Vocational Education and Training (VET) providers in Australia, and Community Colleges in the United States. Private Training Establishments teach a range of qualifications, from foundation numeracy and literacy to degrees, however predominantly their focus is foundation education. Unlike their university counterparts, PTEs cater to the learner who comes with few qualifications, from disadvantaged homes, often with criminal convictions and with a deep suspicion and even antagonism towards learning. The usual PTE has small class sizes, no more than 16 to a tutor, and as such can provide the intensive and often extensive knowledge and skills that the learner needs to progress into either employment or further education. However, many of these adult learners are at risk of not completing their qualification, an issue concerning educational and government agencies, and typifying a trend in education throughout New Zealand [1]. Therefore, recognising barriers to completion is the first step to assisting adult learners, benefiting the educational facilities where they are enrolled, and ultimately benefiting society as a whole.

When youth or adults are not in employment, education, or training, there are costs to both the individual and society [2]. In the United Kingdom, the reported cost of youth aged 16-18 not in employment, not in education and not in training, is on average almost £100,000 per person over their lifetime [3]. Furthermore, the number

of youth falling into this category in the UK is estimated at 1.3 million individuals, at an annual cost of £3.65 billion [4]. Besides economic costs, there are 'human' costs associated with non-completion, including a reduction in the individual's ability to maintain employment, financially support themselves, maintain reasonable health, and to avoid criminal activity and substance abuse [5-6]. In addition, it has been suggested that individuals who fail to complete secondary education, and following this do not complete any tertiary qualification, are more likely to have relationship difficulties and raise children as single parents [2]. Though rarely documented, non-completion of courses incurs costs on the educational institutions themselves, negatively impacting resources, staff allocation, educational effectiveness, and allocation of funding both within the institution and within the broader educational sector [7].

Failure to achieve in any educational contexts has, for obvious reasons, attracted much investigation. The major reasons for failure or non-completion can be grossly grouped into four categories: 1) Social pressure and related stressors; 2) Self-efficacy in relation to being able to achieve; 3) General attitude toward achieving (which is often influenced by past experiences of education) and 4) Self-Esteem levels sufficient to enhance achievement [1,2,8]. Each will now be discussed in turn.

Social pressures are thought to have two components which interact towards behavioural intention; beliefs about how other people, who are some in way important to the person, would like them to behave (normative beliefs) and positive or negative judgments about each belief (outcome evaluations) [9]. There is significant literature that confirms the importance of social pressures affecting behaviour, specifically, indicating that social and parental influence is a dominant factor influencing educational achievement and course completion [10-14].

Self-efficacy is conceived of two components, the first being the perceived ease or difficulty in performing a behaviour, and the second component being an individual's perception of controllability around the task [15-16]. There is evidence to suggest that self-efficacious students participate more readily, work harder, persist longer, and have fewer adverse emotional reactions when they encounter difficulties than do those who doubt their capabilities [17].

Attitude is said to be one of the most important determinants of behaviour [18], and can be defined as "the disposition to respond with some degree of favourableness or unfavourableness to a psychological object", and describe attitudes as being

acquired rather than innate with a direct influence on behaviour [19]. A number of studies have confirmed the importance of attitude in educational outcomes [10,20,22].

The fourth major contributor to educational achievement has been identified as Self-Esteem, which describes an individual's sense of worth, and the level of value and appreciation they place upon themselves [23]. This has been supported by many studies [24-29] with the understanding that Self-Esteem is implicit in academic achievement and reciprocally that achievement increases Self-Esteem. Alongside this, it has been found that emotional and social factors including stress and low Self-Esteem, can predict intention to 'dropout' of education [30]. These findings support the basis of this current study; that low Self-Esteem, unless addressed, will contribute to a poor outcome for the student.

The ability to identify adult learners at risk of non-completion and predict educational outcome would greatly enhance the student's potential in other areas of their life, as well as the provider's results and credibility, funding and future endeavours. However, scant literature is available discussing the ability to predict learning outcomes in this type of student, with the only similar study using the Theory of Planned Behavior to predict learning outcome in high school students [10]. The aforementioned influence of social pressures, the perception of being able to achieve, and attitude, on achievement, are a priori part of a theoretical framework known as the Theory of Planned Behavior (TPB) [31], which has previously been applied in the educational context [10,32,33]. The TPB provides a model that encompasses an individual's attitude towards, and intention to perform the behaviour, and also accounts for the social context of the individual and the pressures they may feel in performing the behaviour [31]. Self-efficacy, which research has shown to have a large effect on behavioural change is also incorporated within the TPB as perceived behavioural control [34].

Current literature reveals a multitude of studies conducted to explore why learners do not achieve educationally [1,8,10,26,27,35], some exploring the relationship between the TPB components, self-efficacy and achievement [17,31,33,36-39]. Thus the use of the TPB has been validated in previous educational research, for example, as a tool to predict intention and consequently attendance for both high school students and university students [10,16]. One particular study using the TPB to identify students that were at high risk to fail, and concluding that early

communication of the consequences of non-completion, if used positively in a remedial manner, could facilitate an improved outcome [10]. Despite there being some focus on achievement in secondary level students, predicting learner outcomes of tertiary level students, specifically those studying through a PTE, have not been explored.

It has been stated that the TPB model could also include additional predictors within the model to increase the model's predictive ability [31], and this has also been supported by other authors, suggesting the addition of factors such as Self-Esteem [16,32]. Our study extends the TPB to include the variable of Self-Esteem as a dominant factor of prediction, given its previously established relevance to educational performance. While Self-Esteem and components of the TPB have individually been identified as being important to predicting achievement, intent and outcome in varying educational contexts [24,31,40-42], little research can be found combining the two methods into a single predictive model, and exploring its relevance for a tertiary institute such as a PTE. Thus the central objective of this study is to determine if Self-Esteem, in conjunction with the factors of the TPB, can predict behavioural intent and educational outcome for an adult learner. To this end the following hypotheses were considered: 1) the Theory of Planned Behavior components and Self-Esteem will predict intention to complete; 2) the components of the Theory of Planned Behavior and Self-Esteem will predict educational outcomes, and 3) Self-Esteem levels will improve over the duration of a programme.

2. METHODOLOGY

2.1 Participants

The sample comprised two hundred and eleven individuals (115 females and 96 males) who were students of a Private Training Establishment (PTE) targeting low or non-achieving individuals in the south of New Zealand's largest city, Auckland. Participants ranged from 15 to 65 years of age ($M = 28.49$, $SD = 13.15$), with males being significantly older ($M = 30.92$, $SD = 13.24$) than females ($M = 25.57$, $SD = 12.50$), ($t_{(205)} = -3.01$, $p < .01$). The ethnic profile of the sample was 41.7% Pacifica, 38.4% Maori, 10.4% European, 8.5% Asian, and 1% other. Individuals in the sample ranged in their English language abilities, but all were required to have at least basic English skills to enrol in courses. The socio-economic status (SES) of individuals was

not directly measured, but typically reflected the general SES of the enrolment catchment region (i.e., extreme deprivation, low SES).

2.2 Materials

In order to test the study's hypotheses, a questionnaire containing a Self-Esteem scale, and Theory of Planned Behavior scales, was developed. Demographic information (i.e., age, gender, ethnicity) was obtained from enrolment information contained in the PTE records. Additionally, final educational outcome (e.g., completed or non-completed) was obtained from the same source. Each will be described in turn.

2.2.1 Outcome classification

Participants were classified according to the Tertiary Education Commission's outcome requirements for Student Achievement Component Funding [43], where a positive outcome indicated participants completed the course, and a negative outcome indicated that they did not complete the course or withdrew.

2.2.2 Theory of planned behavior (TPB) questionnaire

To predict whether participants would complete their course of study, a questionnaire based on the Theory of Planned Behavior (TPB) was developed, based on the 'Theory of Planned Behavior manual' [9] providing stepwise methods to construct TPB questionnaires. The TPB is a model aimed at identifying an individual's intention to perform behaviours and relating this to likelihood that they will successfully engage in these actions [44]. In determining intention, the TPB captures three concepts: Perceived Behavioural Control, Subjective Norms and Attitudes [44].

The TPB questionnaire used in this study consisted of 26 Likert scale items grouped into four subscales. First, Behavioral Intention consisted of a single question encompassing motivation factors driving the behaviour [31], where participants selected a statement between 1 and 5, which best reflected their intention, for example, 1 = "I expect to complete this programme" and 5 = "I probably will not complete this programme". Second, the Perceived Behavioural Control subscale contained ten items relating to the volitional control of the behaviour and the perceived ease or difficulty of performing the behaviour. The scale asks questions such as, "Financial problems may mean that I will not complete this programme" (1 =

Agree to 5 = *Disagree*). Third, the Subjective Norm subscale consisted of ten items indicating perceived social pressure to perform a behaviour, such as, "My friends think that I am doing the right thing" (1 = *Agree* to 5 = *Disagree*). Last, the Attitude subscale consisted of five items assessing the level of positive appraisal of a behaviour, such as, "I believe that I will enjoy this programme" (1 = *Agree* to 5 = *Disagree*).

2.2.3 Rosenberg self-esteem scale (RSES)

Self-Esteem was measured using the Rosenberg (1965) Self-Esteem Scale (RSES) [23], aimed at measuring an individual's general positive or negative attitude toward the self. The RSES assesses Self-Esteem using ten Likert scale items, with participants rating responses to items on a four point scale (1 = *Strongly Agree* to 4 = *Strongly Disagree*). Previous research has suggested a two factor structure to the RSES, reflecting either positive and negative weighted items, [45-46], and the two factor approach was adopted for this research due to the pitfalls associated with treating the RSES as a single structure [47]. Following a Principle Components Analysis, the RSES was found to contain two factors reflecting either positively worded items (items 1, 2, 4, 6, 7) or negatively worded items (items 3, 5, 8, 9, 10), and this result was used to create two subscales, RSES(pos) and RSES(neg), respectively.

2.3 Procedure

A research assistant was employed to distribute the questionnaires to ensure anonymity of responses, along with an information sheet outlining the purposes and procedures of the study. Students were informed that participation was voluntary, and that they could withdraw from the study at any time without reason. To assist the return of completed questionnaires, the research assistant requested the students to complete the questionnaire once given the materials, and to return them immediately after completion, which was approximately ten minutes. Data was then entered into a spreadsheet and demographic information included for each participant's data. Following the entry of all data, participants' names were converted to participant numbers to ensure anonymity. The TPB questionnaire was administered once at the initiation of the course, and the RSES was administered twice; once at the initiation

of the course (Time1), approximately 40 weeks duration, and at completion or point of withdrawal from the course (Time2).

2.4 Analysis

To test that Self-Esteem will predict Behavioural Intention above and beyond the components of the TPB, we created three models and then tested them using hierarchical linear regression analyses. The first model employed age and gender as co-variates (Model 1). Model 2 added the three TPB components (i.e., Subjective Norm, Perceived Behavioural Control and Attitude), while Model 3 included the two RSES subscales measured at the first time point. A comparison of R^2 - change across the three models, and an examination of standardized regression coefficients, determined the relative contribution of each predictor. A further analysis was run to test the ability of the TPB and RSES scores to predict educational outcome. This analysis mirrored the first, but the use of a dichotomous outcome variable (i.e., completion vs. non-completion) necessitated the use of a binary logistic regression. Finally, paired samples *t*-test will be used to determine differences between mean RSES subscale scores at Time1 and Time2, in order to see if scores will improve over time, from initiation to termination of a course.

3. RESULTS AND DISCUSSION

Prior to undertaking statistical testing, the data were assessed for their analytical fitness and explored to elucidate data structure. To this end, the psychometric properties of the data were obtained using conventional descriptive statistics (e.g., means and standard deviations), and internal consistency statistics (e.g., Cronbach's alpha) (Appendix A). Structure was tested for dimensionality using item-total correlations, and for some scales (e.g., RSES) structure was examined more rigorously using Principle Components Analysis (PCA) (Appendix B). Additionally, prior to regression analyses data were screened for normality, linearity, homoscedasticity, and independence of residuals graphically using residual analyses. Each of the major scales and subscales used in this study were found on all counts to be of sound psychometric character as gauged by current statistical criteria. All analyses were performed using the Statistical Package for the Social Sciences (SPSS v. 19).

3.1 Hypothesis 1: Self-Esteem Can Explain Additional Variance in Intention to Complete, Above and Beyond the Components in the Theory of Planned Behavior and Other Predictor Variables

Hierarchical Multiple Linear Regression analyses were undertaken in order to provide summary coefficients of the nature of the relationship between Behavioural Intention and: age and gender (Model 1); subjective norm, attitude, and perceived behavioral control (PBC) (Model 2), and between behavioural intention and Self-Esteem measured at the start of training (Model 3). The latter model, involving Self-Esteem as measured at the first time point (i.e., Time1), used the two summative scales consisting of positively and negatively worded items as extracted from a PCA. Note too that Model 1 is tested in Model 2, and Models 1 and 2 are both nested in Model 3 (see Table 2).

Table 1 presents statistics assessing the statistical fit of the three models. Note that the R values derived from Models 2 and 3 were significantly different from zero ($p < .05$), whilst Model 1 was not. This result indicates that the predictive power of Model 1 is no greater than using the mean of the behavioural intention scores, whilst Models 2 and 3 endowed greater predictive power than this average. The adjusted R^2 values contained in Table 1 show the three models explain between 1% and 17% of the variability in behavioural intention, and the change statistics (right-side, Table 1), show that while the change in adjusted R^2 from 0 to 0.01 (i.e., Model 1) is not significant, the changes between Model 1 and Model 2 ($\Delta R_{adj} = 0.12$) and between Model 2 and Model 3 ($\Delta R_{adj} = 0.05$) are significant. This result indicates that Self-Esteem predicts behavioural intention above-and-beyond the TPB.

Both un-standardised (B) and standardised coefficients are reported, along with standard errors, the outcome of significance tests (via Students t -test), and regression equations in Table 2. Inspection of the t -values reveals that, for Model 1, age is a significant predictor of behavioural intention but gender is not. This negative association between age and behavioural intention is evident across all three models. For Model 2 all three predictors from the Theory of Planned Behavior have coefficients significantly different from zero. As expected from theory, subjective norm had a negative correlation coefficient with behavioural intention, while PBC and attitude had positive correlations. These three predictors remain significant in Model 3, and are joined by an additional significant predictor, the negatively - worded RSES subscale. Additionally, an independent samples t -test was

undertaken to probe for associations between behavioural intention and learner outcome (i.e., completion vs. non-completion), and no significance difference was found between the two groups ($t_{(205)} = -0.129, p = .90$).

Table 1. Summary of the MLR analyses when the ten-item RSES is decomposed into two five-item subscales representing positively and negatively worded items

Model	R	R ²	Change Statistics						
			Adjusted R ²	Std. Error of the Estimate	R ² Change	F Change	df1	df2	Sig. F Change
1	0.17	0.03	0.01	0.17	0.03	1.88	2	180	.16
2	0.38**	0.15	0.11	0.16	0.12	6.08	3	177	.00**
3	0.45**	0.20	0.16	0.17	0.05	4.23	2	175	.02*

* $p < .05$ (2-tailed), ** $p < .01$ (2-tailed)

Table 2. Un-standardised and standardised coefficients for each of the hierarchical multiple linear regression analyses when the RSES is represented by its positive and negatively worded subscales

	B	Std Error	p	t
Model 1				
Constant	2.17	0.04	-	62.63**
Age	-0.00	0.00	-0.17	-1.93
Gender	0.02	0.03	0.06	0.64
Model 2				
Constant	1.33	0.23	-	5.80**
Age	-0.00	0.00	-0.17	-2.04*
Gender	0.01	0.03	0.03	0.40
PBC	0.09	0.03	0.26	2.77*
Subjective Norm	-0.05	0.03	-0.21	-1.96*
Attitude	0.12	0.05	0.24	2.21*
Model 3				
Constant	1.34	0.23	-	5.96**
Age	-0.00	0.00	-0.18	-2.16*
Gender	0.01	0.03	0.02	0.28
PBC	0.10	0.03	0.28	3.07*
Subjective Norm	-0.05	0.03	-0.21	-2.05*
Attitude	0.11	0.05	0.22	2.06*
RSES Positive	0.01	0.01	0.07	0.78
RSES Negative	-0.01	0.01	0.25	-2.88*

Note: Behavioural Intention is the dependent variable. * $p < .05$ (2-tailed), ** $p < .01$ (2-tailed)

3.2 Hypothesis 2: Self-Esteem Can Predict Course Outcome after Controlling for TPB Components and Other Predictor Variables

Self-Esteem scores should also contribute to course outcome, that is, participants with lower initial Self-Esteem would also be more likely to produce a

negative outcome. The analysis and prediction of dichotomous outcomes such as not completed ($N = 167$) or completed ($N = 44$) is best undertaken using logistic regression analyses. Our analyses again comprised of three models, with Model 1 (age and gender), Model 2 (PBC, Subjective Norm, and attitude) and Model 3 (Self-Esteem subscales at Time1) being identical to those employed in the linear regression analyses.

Table 3 displays the effectiveness of the three models in accounting for the data. A battery of Hosmer-Lemeshow (H-L) tests returned non-significant chi-square values for the three models, suggesting that each model constituted an adequate fit to the data. The relative goodness-of fit of the three models is assessed by computing best-fitting parameter estimates using Maximum Likelihood Estimation (MLE). By employing MLE, model selection criteria such as the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) can be employed to adjust for model complexity (i.e., number of parameters). For all three models MLE was used to fit the logistic model (1) to data, and to provide maximum likelihood parameter estimates. The best-fitting parameters are found by minimizing the deviance, that is, the Log likelihood (LL) function multiplied by negative two [48]. The minimized deviance provides evidence in regards to which model most likely fits the data, but does so without respect to model complexity. Goodness-of-fit measures in themselves do not provide sufficient information with which to select a model, and an advantage of MLE is that it can be used with the AIC and BIC selection methods, both of which account for differences in the number of parameters among the models with the model with the lowest value of AIC or BIC being preferred, with the difference between the two being that the BIC penalizes free parameters more strongly than the AIC. It is evident from the final two columns of Table 3 that the three models are comparable in their ability to account for the data, though Model 3, the least parsimonious, has the lowest AIC and BIC values.

Table 3. Summary of the logistic regression analyses when the ten-item RSES is decomposed into two five-item subscales representing positively and negatively worded items

	-2 Log likelihood	H-L Test	p-value	AIC	BIC
Model 1	49.06	9.01	.25	55.06	55.83
Model 2	41.77	6.63	.58	55.77	57.55
Model 3	35.01	5.52	.70	53.01	55.30

Table 4. Un-standardised and standardised coefficients for each of the hierarchical multiple linear regression analyses when the RSES is represented by its positive and negatively worded subscales

	<i>B</i>	Std Error B	Wald	e^b	95% C.I. for e^b
Model 1					
Constant	3.45	1.15	8.92	31.38	
Age	-0.01	0.03	0.11	0.99	0.93 - 1.05
Gender	-0.16	0.86	0.03	0.86	0.16 - 4.59
Model 2					
Constant	-1.66	7.22	0.05	0.19	
Age	0.01	0.03	0.17	1.01	0.95 - 1.08
Gender	-0.31	0.93	0.11	0.74	0.12 - 4.55
BI	3.41	2.66	1.65	30.20	0.17 - 54.49
PBC	-2.09	1.46	2.04	0.12	0.01 - 2.17
Subjective Norm	-0.68	1.09	0.39	0.51	0.06 - 4.25
Attitude	3.24	1.70	3.66	25.62	0.92 - 71.31
Model 3					
Constant	-1.24	7.18	0.03	0.29	
Age	0.01	0.04	0.09	1.01	0.94 - 1.09
Gender	-0.25	0.97	0.07	0.78	0.12 - 5.16
BI	1.98	3.08	0.41	7.25	0.02 - 30.77
PBC	-1.98	1.36	2.12	0.14	0.01 - 1.98
Subjective Norm	-0.60	1.20	0.25	0.55	0.05 - 5.76
Attitude	3.61	1.98	3.32	36.89	0.76 - 83.66
RSES Positive	-0.14	0.21	0.45	0.87	0.58 - 1.30
RSES Negative	-0.33	0.15	4.58*	0.72	0.54 - 97.30

Note: Outcome (completed/uncompleted) is the dependent variable. * $p < .05$ (2-tailed)

Maximum likelihood parameter estimates are displayed in Table 4, both in raw form as logits (i.e., B) and as odds ratios (e^b), the latter accompanied by 95% confidence intervals. Positive values of B indicate that the predicted odds increase as the predictor value increases (i.e., a pass is more likely), while a negative coefficient means that the predicted odds decrease as the predictor decreases (i.e., completion is less likely). The odds ratios, which are conceptually easier to work with, are estimates of the change in the odds of membership to the target group (here completing) for a one-unit increase in the predictor. The maximum likelihood parameter estimates displayed in Table 4 show that the only significant predictor variable contained is the negatively-worded subscale of the RSES, where the odds of completing are 2.1 times greater for a student who has a negative RSES score one unit greater than another student.

3.3 Hypothesis Three: Self-Esteem Will Improve Over Time, From Initiation to Termination of a Course

It is suggested that Self-Esteem should increase over the period of the course; therefore initial RSES subscale scores should indicate lower Self-Esteem than final scores. When analysing the positive component of the RSES, mean scores at Time2 ($M = 12.35$, $SD = 2.31$) were significantly higher ($t_{(205)} = 4.59$, $p < .01$) than mean scores measured at Time1 ($M = 11.52$, $SD = 2.17$). The negative component of the RSES also showed this effect as means scores at Time2 ($M = 10.04$, $SD = 3.39$) were significantly higher ($t_{(205)} = 3.27$, $p < .01$) than at Time1 ($M = 9.25$, $SD = 2.99$).

3.4 Discussion

The ability of educational facilities to predict learner outcome would have a substantial impact on learning, especially in groups known for high rates of non-completion. Through this, the student would have the opportunity to be assessed for risk factors of non-completion and remedial steps could be put in place to mitigate these factors, improving the student's chance of achievement and leading to further employment or educational opportunities. The objective of this study was to identify those factors predicting both learner intention and educational outcome, and the results are now discussed with reference to those aims.

Findings supported the hypothesis that both the Theory of Planned Behavior (TPB) components and Self-Esteem predict intention to complete. After applying a hierarchical multiple linear regression analysis, the three components of TPB; Subjective Norm, Perceived Behavioural Control and Attitude had significant positive correlations to Behavioural Intent, above and beyond the covariates of age (also significant) and gender (not significant). Self-Esteem then proved itself an additional significant predictor, at least when the negative-worded subscale of the RSES was referenced.

In the TPB model, some have questioned the validity of the subjective norm component [16,19,31,49-50]. In the context of the current research, subjective norm, thought to be a major factor in these student's lives, was significant though not dominant. The attitude component is considered global in nature, and may be too general to predict specific intention [19]. However, in this study attitude was found to be a significant predictor of intent to complete education. Perceived Behavioural

Control has been referred to as the most significant factor of the TPB for prediction of intent [10] and is confirmed as a dominant factor in this study.

Overall, the analysis showed Self-Esteem, combined with age, gender, and the TPB, provides predictive power above and beyond age and gender by itself, and age and gender combined with the TPB. These results justify the inclusion of Self-Esteem into the model of prediction of intent, and further support the work of Wang (2009), who suggested that extending the TPB with a more specific variable would result in a more detailed behavioural prediction, the results of which outlined that the inclusion of Self-Esteem provided an improved model of intent to complete [42].

The hypothesis that the TPB and Self-Esteem would predict outcome was only partially supported, with only Self-Esteem predicting outcome. Using binary logistic regression the negatively phrased questions from the RSES emerged as significant predictors of outcome, although the positive RSES subscale did not. Those who responded strongly to the negatively worded questions of the RSES were 2.1 times more likely to achieve a positive outcome. Additionally, the inclusion of Self-Esteem into the variate produced a better model fit than when not included. Self-Esteem as a predictor of outcome has also been verified by Pepi et al. (2006), who found that Self-Esteem was influential in school achievement, especially significant in those groups of students who appeared to have consistently low Self-Esteem. They reported that Self-Esteem was related to socio-economic variables and correlated to academic achievement rate. Students in the study [27] faced similar social constraints and risks to those reported in the current study, thus offering convergent validity in relation to the importance of Self-Esteem and outcome in similar contexts.

Findings also supported the expectation that Self-Esteem will increase over the duration of the programme, with significant increases indicated by the ten item RSES scale and evidenced in both the negative and positively worded questions. Interestingly, individuals returned a clinically borderline level of Self-Esteem ($M=20.59$) when measured at the beginning of their programme, and a significantly higher level at completion ($M=22.36$), and we noted that there were no differences in Self-Esteem levels associated with age, gender or ethnicity. Results do, however, indicate a significantly low Self-Esteem overall with Self-Esteem at completion still only at a mean of 22.36. Indeed, the initial survey result indicated that 115 of the 211 learners had a score below the accepted clinical criteria (i.e., below 20) and at completion this had reduced to 104 learners. Further support of an overall low level

of Self-Esteem has been established previously in first year university students in New Zealand, with these students producing the lowest mean score when comparing countries of similar independent cultural values [51]. This has been supported by other studies concluding that New Zealand, when compared to similar countries, has an overall low level of Self-Esteem [52]. The gratifying finding of this section of the study is that Self-Esteem did increase over the duration of the programmes, albeit a small but significant increase.

3.4.1 Limitations and future directions

All findings should be interpreted within the study's limitations. Statistically, the sample size of 211 students with only 37 failures may have elicited Type II errors due to insufficient power, restricting the ability to successfully predict the influence of TPB components and the RSES on outcome. However, with reference to Cohen and Cohen (1983), our sample size can be considered adequate given the number of variables that were included [53]. Additionally, students were only allowed to choose one item from a grouping of five categories to indicate intent to complete, which may have restricted the variability of this measure. Although this measure was supported by a previous study [9], other studies have successfully enlarged this scale [54]. A further consideration involves generalisability, with only one cohort of homogenous students researched, predominantly coming from the same geographical region and therefore with similar demographics, though age and ethnicity did vary.

This study supports further research into the use of Self-Esteem to predict outcome in education. Scales such as the RSES may be used by an institution to investigate risk to completion, providing that facility with an opportunity of working with identified learners and assisting them to achieve their goal of a positive outcome from tertiary education. Future research could reveal other factors relevant to non-achievement in education and further directions to mitigate these issues. A concern would be that tools measuring Self-Esteem could be used as a screening mechanism prior to enrolment, reducing the risk to the institution of having poor outcome results. This would ultimately serve to limit the already challenged learner's options for advancement, and refusal of entry into a normally accepting institution may compound their already low Self-Esteem [51].

It is also interesting to note that the questions that were negatively phrased in the RSES have proved the most sensitive, which in itself is not a novel finding.

Baranik (2008) suggested that collectivist cultures may respond more strongly to negatively worded questions [51], and this may be a factor in the current study. The ethnic groupings found in the catchment area of the PTE; the Pasifika, and Asian peoples can also be described as collectivist, therefore this explanation as to the dominance of the negative worded questions would be more than mere conjecture.

4. CONCLUSION

This research adds to the education literature by further exploring factors predicting both intent to complete training programmes and actual outcomes. Results showed that ratings on the components of the TPB; attitude, perceived behavioural control and subjective norm, were predictive of an individual's intention to complete their course of study. Our findings suggest that the use of a TPB based questionnaire could potentially be used by tertiary training institutes to anticipate a learner's intention to complete a programme, and may therefore prompt the identification and reduction of risk factors to non-completion. This research also identified that negatively worded items in the RSES sufficiently predicted intent to complete and learner outcomes; that is, individuals that strongly disagreed with the RSES negatively worded items, were more likely to identify positive intent to complete and to complete their course of study. This indicates that the use of self-esteem measures by tertiary training institutes may provide further information around the barriers to completion for an individual and provide a platform for possible intervention. Further studies are encouraged, as the ability to predict outcome in the adult learner would be a significant contributor to the individual, to the learning establishment, as well as to society.

ACKNOWLEDGEMENTS

The authors wish to thank the staff and learners of Corporate Academy Group of Manukau, Auckland.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Appendix A

Means, Standard Deviations, Corrected item-total correlation, and Cronbach's alpha (α_c) if-item-deleted, for the RSES data obtained at two distinct time points (Time1 and Time2)

Item	N	\bar{x}	SD	Corrected Item-Total	
				Correlation	α_c if- Item-Deleted
Time1					
RSES 1	204	1.67	0.57	0.39	.75
RSES 2	209	1.68	0.56	0.40	.75
RSES 3	203	1.93	0.82	0.38	.75
RSES 4	209	1.83	0.68	0.33	.76
RSES 5	208	2.11	0.93	0.34	.76
RSES 6	210	1.60	0.60	0.50	.74
RSES 7	211	1.80	0.64	0.49	.74
RSES 8	209	2.54	0.98	0.38	.76
RSES 9	211	2.26	0.87	0.60	.72
RSES 10	210	1.99	0.88	0.57	.72
Time2					
RSES 1	172	1.45	0.60	0.49	.79
RSES 2	173	1.49	0.60	0.43	.80
RSES 3	172	1.86	0.86	0.49	.79
RSES 4	173	1.61	0.60	0.40	.80
RSES 5	173	1.94	0.91	0.45	.80
RSES 6	173	1.53	0.60	0.46	.80
RSES 7	173	1.58	0.66	0.48	.80
RSES 8	173	2.21	0.97	0.54	.79
RSES 9	172	2.07	0.87	0.60	.78
RSES 10	173	1.89	0.88	0.60	.78

Means, Standard Deviations, Corrected item-total correlation, and Cronbach's alpha (α_c) if item deleted, for components of the Theory of Planned Behavior questionnaire

	N	\bar{x}	SD	Corrected Item-Total	
				Correlation	α_c if Item Deleted
Perceived Behavioral Control					
TPB 1	197	4.06	1.17	.27	.67
TPB 2	197	3.82	1.14	.36	.66
TPB 3	197	3.86	1.20	.29	.67
TPB 4	197	4.31	1.05	.44	.65
TPB 5	197	3.96	1.24	.35	.66
TPB 6	197	4.19	1.07	.27	.67
TPB 7	197	3.94	1.31	.39	.65
TPB 8	197	4.26	1.32	.30	.67
TPB 9	197	4.08	1.24	.37	.65
TPB 10	197	4.13	1.14	.42	.65

Subjective Norm					
TPB 11	206	4.58	0.92	.75	.90
TPB 12	206	4.49	1.01	.72	.90
TPB 13	206	4.46	1.07	.73	.90
TPB 14	206	4.50	1.06	.69	.90
TPB 15	206	4.08	1.30	.52	.91
TPB 16	206	4.32	1.09	.71	.90
TPB 17	206	4.49	0.99	.71	.90
TPB 18	206	4.44	1.04	.73	.90
TPB 19	206	4.33	1.06	.75	.90
TPB 20	206	3.80	1.42	.55	.91
Attitude					
TPB 21	211	4.76	.72	.74	.84
TPB 22	211	4.75	.68	.70	.85
TPB 23	211	4.68	.83	.73	.84
TPB 24	211	4.57	.86	.69	.85
TPB 25	211	4.59	.84	.68	.86

Appendix B

Rosenberg (1965) Self-Esteem Scale (RSES) communalities and factor loadings for two measurement time points (Time1 and Time2)

Item	Time1		Time2			
	Communality	Component 1 ($\lambda = 34.124\%$)	Component 2 ($\lambda = 18.205\%$)	Communality	Component 1 ($\lambda = 37.879\%$)	Component 2 ($\lambda = 18.694\%$)
RSES2	0.60	<u>0.77</u>	0.01	0.53	<u>0.72</u>	0.12
RSES1	0.56	<u>0.75</u>	0.03	0.62	<u>0.77</u>	0.15
RSES6	0.56	<u>0.72</u>	0.21	0.60	<u>0.77</u>	0.10
RSES4	0.45	<u>0.67</u>	0.00	0.49	<u>0.69</u>	0.11
RSES7	0.51	<u>0.67</u>	0.23	0.58	<u>0.75</u>	0.15
RSES8	0.59	<u>0.06</u>	<u>0.77</u>	0.67	<u>0.04</u>	<u>0.81</u>
RSES9	0.58	<u>0.35</u>	<u>0.68</u>	0.59	<u>0.23</u>	<u>0.74</u>
RSES3	0.46	<u>0.02</u>	<u>0.67</u>	0.51	<u>0.09</u>	<u>0.71</u>
RSES10	0.55	<u>0.35</u>	<u>0.66</u>	0.62	<u>0.21</u>	<u>0.76</u>
RSES5	0.38	<u>0.01</u>	<u>0.62</u>	0.45	<u>0.09</u>	<u>0.66</u>

Note: All loadings >0.40 are underlined.

Means, standard deviations, and Cronbach's alpha (c_c) for the RSES and its positive and negative subscales at Time1 and Time2

RSES	Time 2		Time 1	
	M	SD	M	SD
c_c				
Ten-item	20.59	4.34	22.36	4.67
Positive	11.52	2.17	12.35	2.31
Negative	9.25	2.99	10.04	3.39

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Education for All in Low-Income Countries: A Crucial Role for Cognitive Scientists

ABSTRACT

Donor funding has helped enroll in school most children of low-income countries. However, students get little schooling and few opportunities to encode and consolidate information. Many fail to learn and automatize the small units needed for more complex skills, such as reading. As a result, many children remain illiterate and drop out in the early primary grades. However, donors and governments often focus on the socioeconomic difficulties of the very poor and have limited insights on how to teach students who get no academic preparation before grade 1. Furthermore, staff experiences with middle class schools may promote complex instructional methods and raise unrealistic expectations regarding the performance of the very poor. In principle cognitive scientists could provide technical assistance and conduct research on issues relevant to learning for the very poor. In practice, however, essential memory functions needed to explicate the knowledge gaps have little value added in high income countries and receive less attention in academia. Few cognitive scientists are sufficiently exposed to them, while education faculties similarly do not teach them. The question arises how to engage cognitive scientists in international development. There is a need for intellectual leadership in this field. New avenues of collaboration are needed between those who research learning and those who plan the education of the very poor.

Keywords: education for all; low-income countries; cognitive science; neuroscience; reading; working memory; observational learning; elaboration; encoding specificity; automaticity; chunking; international education; perceptual learning; policy advice; teacher training.

ACRONYMS

DFID - Department for International Development; FTI - Education for All Fast Track Initiative Secretariat; GPE - Global Partnership for Education; RTI - Research

Triangle Institute; UNESCO - United Nations Educational, Cultural, and Scientific Organization; UNICEF - United Nations International Children's Education Fund; USAID - United States Agency for International Development.

1. TRIUMPHS AND TRIBULATIONS OF EDUCATION IN LOW-INCOME COUNTRIES

About 60-72 million children are of school worldwide. Ensuring their education, particularly in low-income countries¹, is an important goal of the international donor community. The United Nations agencies and affiliated organizations have devoted much thinking and resources in the last 20 years to improve access to good-quality education for low-income populations.

In 1990, a worldwide initiative was instituted to ensure that by 2015 all children in the world should complete primary school. The Education for All initiative [1,2] has become a high-profile operation aimed at raising the funds needed to close the gap between national budgets and the investments needed for universal primary enrollment. The funds pay for budget items such as school construction, curriculum development, textbook production, teacher training and hiring, management information systems, student assessment, and evaluation capacity development. Efforts have borne fruit. Some of the poorest countries, such as Niger, Burkina Faso, Ethiopia, or Cambodia increased enrollments by multiples between 2000 and 2010 (See statistics at www.globalpartnership.org; Education for All Fast Track Initiative, 2010).

Annually about US\$13.5 billion are needed to educate the children of low-income countries [3,4]. This herculean task is being financed by scores of donor agencies and partners. There are United Nations organizations, such as UNESCO and UNICEF; multilateral institutions such as the World Bank, African Development Bank, the Organization of American States, and others; bilateral donor agencies, such as United States Agency for International Development (USAID); many national and international non-governmental organizations, such as Save the Children, Oxfam, or Actionaid; civil society groups that advocate for education. Many consulting companies are also involved that vie for contracts to implement various initiatives. Partners

¹ *The World Bank defines country groups in terms of per capita gross national income, using the Atlas method. In 2011, thresholds were: low income, \$1,025 or less; lower middle income, \$1,026 - \$4,035; upper middle income, \$4,036 - \$12,475; and high income, \$12,476 or more (retrieved from www.worldbank.org).*

have worked hard to harmonize their procurement and accounting rules to ease the reporting burdens of low-income countries. Thousands of very dedicated staff work in these agencies, managing the bureaucracy and providing advice to governments and donors.

So, do schools in low-income countries teach students the needed basic skills that will help them rise out of poverty? Unfortunately not. Many of the enrolled students learn very little and fail to reach even minimal competencies [5,6]. Early-grade reading fluency tests in the primary grades show that in some countries 90% of the second or third graders fail to read even a single word, and many do not even know individual letters [7,8]. As a result, students abandon school early and remain illiterate; in sub-Saharan Africa, only about 67% of the beginning cohort graduate from primary school, and many of the graduates are functionally illiterate [9]. The Africa Learning Barometer (supported by the Brookings Institution) reported that overall 53% of poor children and specifically 43% of children from rural areas fail to learn basic literacy and numeracy skills [10]. Similar data are reported from other low-income countries, such as Yemen, Papua New Guinea and East Timor.

Failures are not just limited to basic reading or the poorest countries of Sub-Saharan Africa; they extend to higher grades of lower-income countries. International comparison tests such as TIMSS and PIRLS² show large performance differences among the 49-63 countries that participate. (Most low-income countries do not participate.) For example in grade 4, the 2011 PIRLS score for Hong Kong was 571 compared to 310 for Morocco and a scaled score of about 330 for Botswana and South Africa [11, p. 45]. Similarly in the 2011 TIMSS, the 4th grade average score for Singapore was 606 compared to 238 for Yemen.

TIMSS and PIRLS socioeconomic data have showed large score differences by parental levels of income and education. For example overall students of many resources scored in TIMSS an average of 535, and those of few resources scored 415 [12, p. 13]. The students who could do early numeracy tasks very well when they began primary school scored 524 compared to a score of 451 for those who could not do them well. On the basis of these and other data, it was found [13] that children in low-income countries are able to answer correctly only about 30 percent as many questions as children in upper-income countries. It has been estimated [6,11,13] that the learning of the average child assessed in low-income countries is at about the 5th percentile of children in upper-income countries.

² *Trends in Mathematics and Science Study, Progress in International Reading Literacy Study (TIMSS).*

It appears, therefore, that many lower-income countries are raising a generation of nominally schooled but illiterate students. Organizations such as UNESCO have raised alarms (e.g., [14]). Some publications and blog articles describe the situation as a “learning crisis” [15].

In some respects, the learning crisis should not come as a surprise. Many students lack the skills necessary for performance. They often go to school without pre-school experience or home preparation for academic tasks. They may have limited vocabulary even in their own languages; they may have developmental delays and poor executive control. Many suffer from malnutrition and diseases that are known to compromise skills acquisition [16,17]. These students can certainly learn, but they need specific inputs and extra teaching time to master preliminary tasks. In high-income countries, such students would get individualized attention by well-educated teachers, a surfeit of materials, and follow up at home. In many low-income countries, the only available option would be private tuition [18].

Another important reason for failure is limited instruction and little or no feedback. To implement Education for All, public schools of countries such as Malawi or Congo Democratic Republic must admit massive numbers of children with very limited class space or staff. In cities like Lilongwe, classes may have over 100 students in the early grades [19]. The teachers may have the equivalent of 4th grade education, may not know how to teach, and may be absent on average 20% of the time. Schools often start late in the school year and end early [20]. Countries that lack sufficient buildings and teachers may reduce class hours to fit all students in multiple shifts. As a result of all these constraints, the students may only get 39% or less of the instructional time given to first graders in higher-income countries [21]. And when teachers teach, they may interact with the few who can do the work and ignore the rest [22,23]. Nonperformers may attend sparsely until they drop out.

Multilingualism further complicates the picture. In many low-income countries citizens speak numerous languages; so many governments have adopted English, French, Portuguese or Arabic as their language of instruction. Nearly all countries of Sub-saharan Africa and the South Pacific face this complexity. Students must learn the official languages during class at the same time as reading. The above languages happen to have complex spelling systems, which may take two or

three years to master. In addition, textbooks are usually imported, expensive, scarce, or inappropriate for the students' knowledge level. Without them, class time is largely spent copying incomprehensible texts from the blackboard. Scant instruction suffices only for those few who are inordinately intelligent or the better off who get help at home. Thus, Education for *All* becomes in fact education for the gifted.

Clearly the above circumstances reduce the opportunities to obtain new information, elaborate it, practice basic tasks to the point of effortless execution, get feedback. Despite systemic limitations, certain classroom activities could be modified to increase precision, timing, or frequency of some inputs. However, classroom issues receive limited attention. Instead, sociocultural factors are emphasized such as child marriage, child labor, or the effects of income inequalities, emotional and physical well-being in schools, safety issues in conflict-affected countries, or gender (e.g., [24, 25, 26, 27]). Attention to sociocultural complexity may detract attention from instructional variables³, or result in conflicting advice about educational quality and use of funds.

These exigencies are directed at government and donor staff who are burdened with the complex financial and logistical problems involved in expanding their school systems. Procurement events, disbursement schedules, budget meetings, contracts have clear deadlines and take up much of officials' time. Multiple and complex demands for accountability may push learning issues low on the agenda.

Given the exigencies of political economy and the extreme limitations of low-resource schools, how can students learn more and perform better? Whose advice to governments and donors is most likely to achieve results? The article presents some aspects of this very complex topic and suggests how research on memory and cognition can be used to improve learning outcomes for the poor.

One note is important on documentation. Many cited reports by donor agencies and consultants are work documents that may not necessarily meet rigorous academic standards. Also, certain topics that are well-known in international development have

³ For example one draft consultant report about Ethiopia stated in 2013: "Learning outcomes depend on a variety of factors, both on the side of educational provision, and with regard to sociocultural, environmental, and individual factors. Any assessment of the impact of higher teaching quality on learning outcomes must take account of this complexity".

not necessarily been documented, such as the academic background of staff. However, the issues are critical and merit publication.

To illustrate the knowledge needed, some real-world questions are presented below.

2. THE LEARNING CRISIS AND POLICY ADVICE DILEMMAS

A foreign service officer from a European country manages the bilateral aid program of her country in certain African countries. Citizens in these countries speak 15-37 languages, so instruction takes place in English, French, or Portuguese. Textbooks are scarce, so most classroom time is spent on transcription; and about 85% of students remain illiterate. In the course of a week, the following topics require input. What policy advice could be offered and on what basis?

- Many donors advocate that children should learn in a language they know best, so one government developed a policy of teaching children in local languages for the first three years. One colleague wonders why it is necessary to delay English-medium instruction. His children went into French immersion class and did very well. Which research studies can be used to facilitate decisions?

- A team of economists spent about a million dollars for a randomized experiment that tested whether better school management improves learning outcomes. The answer was negative. (See for example [28]). The economists searched for answers, but they did not think of examining the grade 1 reading book used in that country. The book started with entire sentences in English and no obvious attempt to teach letter sounds. How important was the textbook vis-a-vis school management?

- The primary education director in the Ministry of Education is preparing new books for grade 1 reading but gets contradictory advice. Some specialists believe in phonics and others in the whole word approach. Some suggest that instruction should start with entire sentences, then words, then letters, and others believe in the opposite order. Which research could be used to predict likely outcomes of each viewpoint?

- Many students completing primary school can barely decode, so the government was advised to start youth centers that would teach “flexible” 21st century skills. A consultant will develop competency-based curricula that will minimize teaching of facts and focus instead on critical thinking and catalytic communicative skills. Does existing research suggest that this will work?

- To develop creativity among students, one government plans to buy one million inexpensive laptops. Most students are illiterate, and the computers do not include software for teaching basic skills. (See for example [29]). Proponents say that computers will improve 'lateral thinking'. Should this low-income government spend scarce revenues to buy laptops for all children?

The above questions are hard to answer and are rarely encountered in higher income countries. Governments and donors must decide on certain solutions that are reasonably effective and politically acceptable, and then dedicate taxpayers' money to them. Many decisions have far-reaching consequences for citizens and typically involve millions of dollars. They must often be made in a matter of days or weeks, so research studies are out of the question. It is important therefore to follow the most reasonable advice available at a given moment.

Which body of knowledge can effectively advise governments and donors on how to improve learning in low-income classrooms? No clear contender exists. Staff who work in international development typically have advanced degrees in a wide variety of fields, which typically offer no learning-related coursework: Economics, finance, statistics, political science, international relations, comparative education, education policy, sociology, political science, or literature. Not surprisingly, donor agencies tend to recommend policies that reflect the academic preparation of employees. Few documents offer actionable instructional advice (e.g., [30,31]). Instead, agencies produce countless documents attributing learning problems to low incomes, gender biases, psychosocial development, community conflicts, social theory, or malnutrition [32,33].

Economic and management advice may also detract attention away from classroom learning. Certain economists consider the classroom a "black box" and they posit that if teachers are made accountable, they will somehow find means to make more students learn. To improve quality, governments are urged to invest in school-based management and give grants to schools under the supervision of citizen committees [34]. Countries are also advised to invest in merit pay and training, in hopes that incentives will increase attendance and teaching quality. To assess and evaluate the results of various interventions, the donors have heavily invested in statistical data collection and international comparative tests [35].

Added to the varied academic backgrounds of donor agency staff is the human tendency to interpret unfamiliar situations through easily available memories (e.g.,

availability bias [36, pp. 65, 129-136]. Few studies have explored the educational beliefs of staff (e.g., [37, p. 71; 38]). But whenever instructional advice is given, it seems to reflect a middle-class perspective of well-trained children who have been learning academic content since birth. As shown above there are large test score differences across socioeconomic strata; the better-off students may be better prepared to study more complex topics, and they are more likely to have better educated teachers. These may be reasons why education advisors often condemn memorization and recommend “modern” discovery methods over “traditional” routines. They may recommend a child-friendly classroom climate, “active learning”, child-centered learning, constructivism, transformative education, teaching that is individualized and relevant to children’s lives (e.g., [39,40]). They may expect teachers who are barely literate to carry out reflective practices and complex classroom activities [41], [24, pp. 54, 110]. Some expect all teachers to use computer technology, discounting the training and procurement problems likely with large-scale applications.

Since there is no clear corpus of research that guide on difficult issues, large-scale consultations are sometimes held to arrive at “best practices”. Certain organizations may invite hundreds of staffroom international agencies and organizations involved in education and ask them to comment on various questions until a consensus emerges. For example, the Interagency Network for Education in Emergencies (INEE) has conducted hundreds of workshops seeking advice from persons involved in education on how to teach conflict-affected children. The consensus resulted in about 70 variables to be used as Minimum Standards for education in emergencies (www.ineesites.org). The theoretical framework created by these standards emphasizes community involvement, security, human rights, emotional healing, and teaching according to cultural context. The Brookings Institution also led a large consultation in 2012-13 to determine what the students of the world should know and how to measure their achievement [42]. In the first two phases of the study, nearly 1,000 people in 84 countries informed task force recommendations. However, few of the participants had experience in teaching school or studying memory research. The document with the initial findings uses in 101 pages the words ‘learn’ or ‘learning’ about 209 times and ‘teach’, ‘teaching’, or ‘teacher’ about 26 times. However learning research is rarely cited in conjunction with these⁴.

⁴ *Another document on the education of marginalized children uses the word “learn” or “learning” 153 times in 35 text pages. It also uses “teach” and “teaching” 18 times, but it does not refer to any research or propose means for students to learn better [27].*

Overall, the chorus of advocates about the education of the poor rarely includes people with expertise on how people learn. Few if any staff working in international development have studied cognitive psychology, cognitive neuroscience or related disciplines. If expertise in learning were more widely available, information processing principles could be used to advise governments. An international strategy to make learning more efficient could focus on the information processing commonalities of humans rather than cultural and individual differences: encoding, consolidation, retrieval, forgetting [43]. The environment certainly modifies some aspects of learning and cognition [44]. However, similarities of cognitive development across cultures at about the same age suggest applicability of basic information processing functions to children [45]. It could be possible to optimize classroom activities of low-income countries and increase efficiency in encoding, consolidating, and retrieval of needed information.

Research suggests that people must first learn to execute essential skills fast and automatically, so that they can devote their working memory to more challenging and complex cognitive tasks. Fluent performance in various skills results from practicing and automatizing progressively larger chunks of information [46,47,48,49]. Students must also acquire networks of well-connected knowledge that will effortlessly arrive in working memory to help reach conclusions and make decisions [50]. As mentioned earlier, many students in low-income countries fail to master fundamental skills, and subsequently perform poorly in the more advanced skills. This pattern suggests failures to learn what might be called for a lack of a better collective term, “simpler” cognition:⁵ perceptual learning, chunking, mapping letters to sounds, reading and math automaticity, executive control. To put it simply, it is difficult for students to analyze the meaning of text when they can hardly lift it “off the page”. It is hard to engage in critical thinking and transformative learning when students must consciously search their memory for essential information items. Survivors able to tackle more complex concepts do so years later than students of the same grades in better off countries.

⁵ “Lower-level” processes are not simple, but the term ‘simpler’ cognition is used as a placeholder, given the frequent use of the term “complex cognition”.

Government and donor staff have not sufficiently focused on these prerequisite skills. The “simpler” cognitive functions are largely unconscious, so people have limited insights about them [51, p. 47]. Also middle-class children, with whom donor staff are familiar, learn them quickly. This may be one reason why documents often lament the lack of basic skills but rarely drill down into the specific variables that must be reinforced.

These variables could come sharply into focus if an information processing framework guided educational decisions. It would emphasize in all cultures the acquisition of speed and automaticity in basic skills, such as reading, writing, or math [52]. Without this focus, advice to low-income countries can be misleading. The following section offers some examples.

2.1 Reading Instruction for the Very Poor

Reading is the skill that falters most often in low-income countries. Early action is crucial because often students drop out in grades 1 and 2. Fluency acquisition by the end of grade 2 at the latest may help them stay in school; and if life circumstances force dropout, fluent readers may continue to decode environmental print and thus retain the skill [53]. To teach such high-risk populations governments should aim for efficiency. Teaching methods should target the weaker students and aim to teach nearly everyone to read.

Reading neuroscience helps point to the important variables and activities that may speed up automaticity. Visual perception research suggests that simpler visual patterns are faster to automatize and critical spacing affects reading speed [54]. Practice with corrective feedback reduces reaction time and links letters into increasingly larger chunks [55]. Eventually, the visual word form area is activated, enables recognition of entire words [56], and makes it possible to process multiple letters in parallel. Many psychological and educational studies suggest that teaching individual letters matched with sounds may efficiently automatize reading (e.g., [57, 58]). In consistently spelled languages, which constitute the vast majority of the world's languages, fundamental instruction requires only about 100 days in most scripts [59]. By contrast, literacy instruction in the complex orthographies of English or French takes about three years and requires some learning of whole words [58]. Word shapes constitute more complex patterns that take longer to automatize.

Unfortunately low-income countries often get garbled advice. Reading specialists tend to come from high-income Anglophone countries and may have ambivalent

feelings about phonics, given that instruction in English cannot completely rely on them. And since middle-class children progress quickly, curricula are often designed to focus on textual meaning rather than teach the script [60, pp. 2, 116].

However, to understand, students must read fast enough to input sufficient text into working memory and retain it long enough to make sense out of it. If they know the words, they may understand their literal meaning [59]. The relationship between speed and comprehension has been documented repeatedly in education [61,62,63], but without understanding working memory functions, the relationship makes no sense to some education advisors. Some argue that speed should be discouraged because children may just “bark at print” [64]. Several others state that if students do not understand what they read, they are not really reading; they are merely decoding. But with limited practice, it may take years to acquire fluency. And those who manage after years of schooling may read too slowly to make sense of texts or learn much information from them [7].

Teacher training transmits these ambiguities about reading. For example, Kenyan teachers are rarely taught how to teach reading and may even use whole word techniques for consistently spelled languages like Swahili; they are sometimes advised to focus on language development, picture recognition, inferences, and prediction [65]. Another result of ambivalence with respect to speed and practice is the design of grade 1 reading textbooks. They typically have big pictures, few pages, and small amounts of text, so children whose parents cannot afford books cannot get more practice [66].

The outcome of confused beliefs about reading acquisition is evident in the textbooks of many low-income countries (e.g., [67]). Students receive whole-word instruction without textbooks in an unknown language that has a complex orthography. It seems a bizarre way to teach reading, but all over Africa it happens every day.

With political will, this fundamental cause of the learning crisis can be mitigated in about two years. Given the time limitations of low-income students and schools, curricula might prioritize fluency. To help nearly all students attain automaticity, governments are advised to adopt synthetic phonics and teach reading in local languages whenever possible, since the latter are consistently spelled. Letters are to be taught one by one, with pattern analogies, plenty of practice opportunities, phonological awareness, and writing. Grade 1 textbooks should have well-spaced letters, should maximize text than pictures, and contain substantial amounts of text since no other reading materials exist to help achieve automaticity [66]. Reading in official languages

such as English or French might best be deferred until students have acquired automaticity in the same script. During the months that students are engaged in this process, the official language could be taught orally.

Some governments agreed to implement this advice, and school-level pilots showed greatly improved student performance compared to control schools: In Cambodia, performance improved from one year to the next in all measures. For example, letters by minute rose by over 100% (from 30 to 63 letters), words per minute by 63% (from 23 to 35 words), and comprehension by 70% (from 48% to 68% answers correct; [68]). In the Gambia, only 50% of the lessons were taught on average. Still, the percentage of first graders knowing at least 80% of the letters was 69% in the Pulaar language and 57% in Wolof (target was 85% of children [69]). Following six months of application in grade 2 in Egypt, word and text reading fluency rates doubled in comparison to rates obtained two years earlier (from 7 to 15 and from 11 to 21 words per minute respectively; syllable reading tripled from 10 to 28 syllables per minute). By contrast, the same measures in control schools improved only by about 27%. The percentage of students reading 0 correct words was cut by half in project schools (from 44% to 21%) while in control schools it improved only by 10% [70]. The Cambodian and Egyptian programs have been scaled up nationwide by the third year of implementation.

Learning research also helps predict and improve outcomes of teacher training. Poorly educated teachers have been hard to train, and methods imported from middle-income countries have given limited results [71]. Knowledge gaps may impede the retention of unfamiliar pieces of information, and efforts to bring consciously much material in mind may result in cognitive overload [72,73]. In addition, inservice training often is offered through intense brief courses given at training centers. Under such circumstances state-dependent learning and spaced learning research would predict limited recall for long-term use [74,75]. Thus when teachers return to their classrooms, the content may become a vague memory and without reviews, it may fade as work urgencies take over. However, observational learning research findings suggest that teachers may remember better to carry out activities they watched, particularly if they also visualized themselves executing them in class [76,77,78]. Thus, videoclips of the desired behaviors may effectively help train teachers of limited education. These and other learning concepts can help use donor funds more effectively when teachers are trained.

The need to execute effortlessly the building-block skills before engaging in more complex problems seems applicable at all educational levels. Methods that skip preliminary steps or assume that students will learn them rapidly on their own may succeed in teaching mainly those who are better off. Also methods that require little-educated teachers to make multiple rapid decisions and keep track of many items simultaneously may be abandoned. For governments this implies revision of curricula to ensure fluency in component skills, affordable textbooks for all students to facilitate formation of cognitive networks, use of classroom time for practice and elaboration of knowledge, training of teachers to engage students in relevant tasks, and remediation at public expense to those lagging behind.

To disseminate and apply these concepts on a large scale in lower-income countries, experts are needed who understand these principles in detail and can clearly enunciate them. But very few exist. The following section discusses the reasons and proposes some solutions.

2.2 Attracting Cognitive Scientists to International Development

Most studies exploring chunking, automaticity, working memory capacity, or conditions that optimize retention are old. Hundreds of publications from the 1940s to the 1990s explored elementary memory operations. (See for example [79]). The findings have been taught in cognitive psychology courses for decades. Over time, research has specified variables better and measured them more exactly, while neuroimaging has succeeded in linking some cognitive functions to brain functions. Overall, the information processing framework remains valid.

This older body of research has considerable utility for low-income schools. Often nonsense words were used in order to limit knowledge about a subject, and in some ways the paradigms resemble the poor students' limited knowledge. For example, the relationship between instructional time and practice can be clarified by using the cognitive psychology experiments of that period (see for example [80]).

For the education of high-income countries, however, elementary memory operations offer little added value. Students enter grade 1 with much academic knowledge and move quickly beyond basic skills towards issues of greater cognitive complexity [81]. With parents attentive to children's learning at home, the relationship between classroom time and outcomes becomes muddled. Thus fundamental topics such as chunking have become less interesting, and they get less space in cognitive science syllabi. And as complexity increases, the earlier paradigms may appear

simplistic. For example, Daniel Reisberg's 2001 edition of undergraduate cognitive science had informative illustrations of nodes and links of cognitive networks, but by the 2009 edition, they had been omitted [50,82]. Lack of opportunities in explaining and applying these concepts may make it hard for cognitive scientists to identify potential applications and advise low-income countries.

Psychologists may be leaving these concepts behind, but colleges of education have rarely taught them. Traditionally, educators and psychologists have rarely collaborated [83,84,85,86]. Faculties of education have constructed theoretical frameworks on the basis of practices and philosophies of educators such as John Dewey, Lev Vygotsky, Maria Montessori, or Paulo Freire. These luminaries exerted their influence before most cognitive research was carried out. Some contemporary educators discuss learning in terms of ultimate results, as in transformative learning [87, p. 3-4]. Specific or intermediate memory processes seemed to have been locked in a black box. Few know where to find the key, and there is limited interest in looking for it.

Moreover certain education professors express caution against cognitive science or neuroscience. Some believe that information processing is a reductionist framework that leads to narrow and mechanistic prescriptions [88,89,90,91]. Similarly certain textbooks that teach reading to university students caution against using cognitive science [92]. Such beliefs are inevitably transmitted to students who are the next generation of workers in international development. It is difficult to base justifications on concepts that specialists have learned to ignore.

To mitigate the learning crisis in low-income countries therefore, the challenge is considerable. The existence of building-block cognitive concepts must be demonstrated, often to skeptical audiences. The concepts must become attractive to teach in seminars or training events aimed at government or donor decisionmakers. Potential middle-class biases must be discussed diplomatically, and somehow decisionmakers must be trusted to remember and use explanations that run counter to their beliefs.

Thus solutions with a high payoff for the poor may be mired in perennial philosophical disputes among academics and lie unused. Arguably, the standards of higher-income countries create obstacles for the education of the marginalized.

Can cognitive scientists fill the needed role of learning specialists in international development? Graduates are relatively few and are usually absorbed in the job markets of higher-income countries. When they conduct research, it is funded by institutions as the National Science Foundation that are interested in topics pertinent to

high-income countries. So cognitive scientists are unfamiliar with donor agencies, and the latter are similarly unfamiliar with what cognitive scientists can do.

And the cognitive scientists who are interested in international development need preparation. They must become familiar with the learning needs of very constrained environments. It is hard for inexperienced people to conceive of students dropping out in grades 1-3 or of the need to make children literate by the middle of grade 1. There is a need to understand international development issues and the functions of various donor agencies. There would also be a need to function in foreign languages such as French, Portuguese, or Arabic. Coursework and internships in bilateral or multilateral organizations would fulfill these needs. Thus, interested professionals would become able to function as consultants or full-time staff of donor agencies or contractors.

Some cognitive scientists might collaborate productively with departments of comparative and international education. These departments focus mainly on sociocultural and economic issues of education across countries and offer no courses in learning. However, the faculty and students often conduct field research in low-income areas, sometimes observing classes for months in rural Sub-Saharan Africa. Joint research might be most useful in addressing priority topics on improving learning efficiency for the poor. And it may encourage international education departments to introduce coursework on learning.

3. PRIORITY LEARNING RESEARCH FOR LOW-INCOME COUNTRIES

The research on the building blocks of learning is broadly applicable to all humans, but the studies were mainly conducted with college students in the U.S. Findings are being used translationally to formulate hypotheses. However, new rigorous research is needed to unravel the learning issues that hold the very poor back at all stages of education.

Of primary importance are topics pertaining to the acquisition of automatized perceptual and performance skills by children and adults. Crucial are visual pattern recognition features that can help speed up literacy acquisition in children and unschooled illiterate adults [93,94]. To help determine the easiest methods to teach basic reading to nearly all students, parameters for chunking might also be developed, picking up where older research left off (e.g., [95]).

For fluent and effortless performance in basic math, there is a need to understand better how to develop the number sense and the Weber fraction of poor students, particularly given the limited instructional means of poorly resourced schools [96].

One risk of dropout in the early grades could be referred to as *literacy attrition*. If a student drops out soon after acquiring reading automaticity, is that lost? Research suggests that 6 year olds forget more information than 9 year olds [97]. But is automaticity as forgettable as episodic information? A 1986 study [53] found that Egyptians who dropped out fluent readers in grade 4 maintained and improved their skills, while those who could not read well forgot what they knew. As with language attrition, children may forget how to read, but the parameters are not known. Variables influencing the permanence of automaticity could be aggregate hours of practice, maximum reading speed attained, practice intervals, age at abandonment, or something else.

Countries with large numbers of languages are often advised to offer reading in a subset of languages that are used for regional communication. Residents often learn them from casual interactions, such as commercial transactions. Community learning is certainly important [98]. However, the parameters of learning languages from the environment are unknown. On average how much do students learn across time? How does language knowledge limitations affect their reading automaticity?

Some people ask why it is worth using a regional lingua franca rather than use English from the beginning. The consistent spelling seems to confer an advantage over English and French, so one small study showed benefits [99]. But how big are they and what are the costs? Languages are learned through interaction, so children cannot learn a language merely by watching TV [100, pp. 133–144]. However, does a broadcasting teacher in a class constitute an intermediate situation? These issues must be explored.

Students' knowledge is limited by teachers' information processing capacity. To succeed in training teachers who have limited education, many questions ought to be answered. For example, what are the most effective ways to improve teachers' automaticity in basic math calculations so that they can check students' work instantly and effortlessly? Insights are also needed on how many and how complex tasks these teachers can comfortably carry out and how to estimate these empirically. To use

observational learning protocols in teacher training, information is needed on the optimal “dosage” that would maximize the probability of executing in class the behaviors presented through videos.

Some officials expect that marginalized students will somehow learn acceptable skills despite scant instruction. To provide some realism, older studies of learning rates could be repeated with low-income populations. For example, what would be the lowest amount of time spent engaging in a task, and what would be the optimal distribution of practice sessions that would enable 85% of learners to attain reading rates of 60 words per minute in two school years? Similarly, what would be the minimum amount of time and optimal distribution that would enable 85% of the students to carry out correct arithmetic operations on 10 or more digits per minute in grades 1-3? [59]. The questions are not limited to primary education. For secondary or higher education students who have spent their school lives without textbooks (as in Mozambique), there is a need to research how to optimize the remaining time and teach efficiently the basic concepts they have missed. The contribution of technology must be studied from this perspective, though large-scale remediation programs have been limited.

An important advantage of engaging cognitive (neuro) scientists in this research is training in neuroimaging and instruments such as event-related potentials. To optimize instruction in difficult circumstances, it is insufficient to collect mere paper and pencil data. There is a need for eye trackers, experience sensing devices, or psychophysics displays. fMRI⁶ can be realistically used mainly in countries such as South Africa or India, but eye tracking and event-related potentials equipment have become portable. These would provide valuable insights in the workings of children who read and count under circumstances that have probably never been researched.

One difficulty with the needed research is that such studies have limited relevance to higher-income countries; therefore funding has been nearly impossible to get. However, donor agencies are becoming more interested in financing learning research. A partnership led by the World Bank has been developing parameters for various topics. It is hoped that suitable amounts of funding can become available. Research targeted on learning basics is urgently needed if the Education for All initiative is to succeed.

⁶ *Functional magnetic resonance imaging (fMRI).*

4. FUTURE PROSPECTS IN THE EDUCATION OF THE VERY POOR

The learning outcomes of the very poor clearly demonstrate why it is important for the donor community to understand better the principles of learning. Certainly, economic and other socioeconomic factors must be mitigated so that children can enroll, attend, and stay in school. But when children come to class, they must process information according to certain biologically determined requirements. One of them is a need to learn the fundamental components first and perform them with sufficient speed to undertake sequences of operations within the capacity limits of working memory.

In high-income countries, students usually get plenty of elaboration and practice opportunities, so they become adept at basic skills and can quickly progress to more complex tasks. Tackling more complex concepts may help students become more efficient learners, so the amount of information that higher-income students can abstract, organize, and retain increases exponentially [101]. But in low-income countries, the limited prior knowledge and instruction make it hard for learning rate to take off. Delays in acquiring the basics delay the acquisition of complex information. Limited practice with reading, writing, and math may make work slow and tedious and limit what children can achieve. Each operation may require extra milliseconds, and these add up. But operations must nevertheless be conducted inside a working memory window that has limited capacity. Thus, processing speed can affect whether a test item can be answered correctly, incorrectly, or just abandoned. Small but systematic differences in basic skills performance may add up over the grades and result in large performance differences between the higher and lower-income countries in international comparisons.

Differences in learning rate may explain to some extent the findings that the average child of lower-income countries performs at the 5th percentile of wealthier countries [13]. The score difference in PIRLS between Hong Kong and Morocco suggests that very roughly fourth graders in Hong Kong may get 150% more information than Moroccans, given an equivalent text and same timeframe. Fourth graders in Singapore may do roughly three times more arithmetic operations than fourth graders of Yemen.

Scores of tests like TIMSS are analyzed through sophisticated procedures and extensively discussed in various countries and the donor community. Much is made of the differences in international comparison tests, but insights about their evolution are

rather limited. Certainly home background is important, but in some respects it is distracting. Educational systems cannot educate homes; they must concentrate on what can be done in class.

The author has found a few cross-cultural studies on reaction-time [102]; but no studies have been found that tracked performance on variables leading to those test scores, such as response time to simpler and more complex tasks and amount of information retained over weeks or months of school. Possibly response times to simple reading passages and math operations could follow a logistic S curve, with low-income countries at the bottom. But without a good handle on information processing variables, government and donor decisionmakers find it hard to focus on the critical variables to improve during school. And without a valid causal chain, it is not easy to remedy deficits.

Intellectual leadership is therefore needed to explain issues convincingly and open new areas for research. Such leadership might best be provided by scientists who understand the how memory works. If governments focus curricula on the automaticity of small information chunks, the performance gap between the poorer and richer countries may be reduced. Without expertise on information processing, such an outcome is unlikely. Colleges of education produce legions of PhDs every year who lack the training to deal with information processing. And there is no evidence of imminent change in this respect.

Due to a lack of expertise, the education of the children who live on a dollar pay day may be compromised by the very people who aim to help them. Education specialists in low-income countries routinely design curricula that seem aimed at average rather than lower scores of international tests. The curricula cover large amounts of material, expect students to read several pages on their own per day, develop reading textbooks on the basis of whole-language methods, assume that students somehow have learned thousands of English and French words by grade 4, and leave much to the discretion of poorly educated teachers [103]. Therefore students get little if any exposure to the preliminary knowledge needed for learning the more complex materials. This is how middle-class standards may rob the poor of the scant learning opportunities that international donors put at their disposal with so much effort.

As things stand in 2013, the academic community that once generated the basic memory principles has moved on. But the mission to educate the millions of students who live on a dollar per day is barely underway. To serve them, we must

reintroduce the 20th century research pertinent to simpler cognition. Teaching and re-researching essential memory principles might produce better informed policies and learning outcomes. Without them, pouring billions of dollars into the budgets of low-income countries is tantamount to dropping food packages on isolated villages and hoping that some will fall into cooking pots. Disappointment may reduce donor investments or divert them from education to other sectors (See for example [104]).

The challenges to disseminate and apply these concepts are significant but if suitably prepared cognitive scientists become engaged, there is hope. To teach the poor efficiently and fulfill children's UN right to education, human cognitive commonalities offer unique opportunities. In all countries, governments must offer students dense and well-connected networks of knowledge, with automatized basic skills. Thus human capital can be optimized worldwide. And some currently obscure psychological research can be shown to have worldwide implications.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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Moral philosophical views

Hussein Voizi Koshifi

Abstract: The article is devoted to the analysis of scientific heritage of the great scholar Khusane Voizy Koshifiy who lived and created in the Timurid's epoch. This article is expressed the point of view belonging to philosophy and morals.

Keywords: Khusane Voizy Koshifiy, scientific heritage, moral pilosophy, islam, teaching, suphism, righteous man, behavior in suphism.

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Нравственные философские взгляды

Хусейна Воизи Кошифи

Аннотация: Данная статья посвящается анализу научного наследия великого учёного Хусейна ВоизиКошифи, который жил и творил в эпоху Темуридов. В статье освещаются взгляды, касающиеся философии нравственности.

Ключевые слова: Хусейн Воизи Кошифи, научное наследие, нравственная философия, «Ахлоқи муҳсиний», кадрият, воспитание.

Хусейн Воизи Кошифи является одним из выдающихся учёных, который жил и творил в эпоху господства Темуридов, когда были созданы все условия для процветания науки и культуры и оставил после себя плодотворное духовное

наследие. Хусейн Воизи Кошифи, который жил и творил почти в один период с великим поэтом Алишером Навоий (1442/46-1505), наряду с тем, что он один из крупных теоретиков исламской религии, он ещё является выдающимся деятелем, создавшим бесценные произведения в областях нравственной философии. Произведение Хусейна Воизи Кошифи «Тафсири Хусайний», о толковании Корана является знаменитым. Также учёный является автором ряда произведений по астрономии, философии, литературоведению, лингвистике, богословию. Влияние Алишера Навои в содержательной и благотворной творческой деятельности Хусейна Воизи Кошифи было огромным. Алишер Навои беря под свою защиту Хусейна Воизи Кошифи, покровительствовал ему и высоко оценивая его талант, выделил ему особое место в своих мемуарах «Мажолисуннафоис». Произведения Хусейна Воизи Кошифи «Футувватномаи Султонийёхуд Жавон мардлик тариқати» и «Ахлоқимуҳсиний» очень известны среди народа. В данных произведениях произведён философский анализ нравственных особенностей людей в их общественной деятельности.

Мы не допустим ошибку, если скажем, что в произведениях Кошифий правила нравственности выработаны в совершенстве. Он подробно излагает все правила нравственности необходимые для жизнедеятельности человека. Особенно, в произведении «Футувватномаи Султонийёхуд Жавон мардлик тариқати» подробно освящаются правила приёма пищи и воды, правила поведения на вечеринках и беседах, этика одежды и путешествия, этика приёма гостей и путешествий, этика приветствия, этика дани братству и дружеских обязанностей. Например, об этике приёма пищи он говорит следующее: «...должна быть разница между приёмом пищи животных и людей. Так как, животные живут, чтобы есть, а человек ест, чтобы жить. Эти два вида приёма пищи проявляются в этике поведения приёма пищи. То есть, человек соблюдает правила приёма пищи, но животные не знают их. Если спросят сколько правил приёма пищи существует, скажи, что тридцать семь. Четыре фарз и четыре суннат, четыре мустахаб и десять правил этикета и четыре уважения и четыре изречения и семь правил предостережения» (1.72) Под понятием фарз делает упор на приём чистой и неиспорченной пищи. Под действием суннату делая внимание на мытьё рук перед едой и принятие пищи правой рукой.

Излагая десять правил приёма пищи утверждает следующее: - садится сначала левой ногой; есть около себя; не смотреть как едят другие; есть с одной

стороны посуды (или касы); есть еду тремя пальцами; облизывать пальцы; почистить посуду; если уроните еду с рук взять её и если она испачкалась почистить только потом есть; во время приёма пищи не прислоняться; после приёма пищи мыть руки.

«Если спросят какие четыре уважения, скажи это: во-первых, не чесать голову во время еды, во вторых не вытирать нос во время еды, в третьих, не капать слюной, не разговаривать с едой во рту» (1.73). Четыре изречения он формулирует следующим образом: не откусывать крупными кусками, хорошо прожёвывать пищу, много не есть, не есть на сытый желудок.

Под семью правилами предостережения он имеет в виду: не критиковать ни какую пищу, если плохо приготовлено: не есть пока не узнаешь где и кем приготовлено; не трапезничать одному, приглашать всех к трапезе; не есть блюдо, которое приготовлено для чванства, тщеславия, сдерживаться от блюда, которое приготовлено по причине похорон; удовлетворяться одним видом блюда (1.74). Точно также излагает одиннадцать правил питья воды. Мы только изложили рассуждения об этике приёма пищи. Как было указано выше, все правила поведения, касающиеся всех отношений человеческой деятельности изложены также подробно.

Подробно изложены правила поведения владельца каждой профессии, ведущий деятельность в социальной жизни общества, указывает на какие их особенности обращать внимание и обходить какие их стороны.

Проанализированы правила поведения среди народа, водоносов, уличных артистов: борцов, артистов по поднятию тяжестей, канатаходцев, артистов по поднятию булавы, артистов по киданию камней, артистов по катанию шаров. Также подробно описаны поведенческие нормы аптекарей. В произведении философски проанализированы смысл и содержание каждой профессии необходимые поведенческие правила и запреты.

В произведении философски анализируются правила поведения и запреты для каждого владельца профессии в зависимости от значения и содержания его профессии, а также необходимые для данной профессиональной деятельности.

В трактате «Ахлоки мухсиний» категории нравственности, как терпение, чистота, стыдливость и целомудрие, благородство, целеустремлённость, справедливость, уметь прощать, помилование, кротость, красивое и мягкое поведение.

ние, сострадательность и милосердие, щедрость и благотворительность, неустойчивость и благочестие, правдивость, осторожность и неторопливость, тактичность и порыв, энтузиазм, проницательность, умение хранить тайны, ценить время, соблюдать права, излагаются в виде наставлений. При изложении тем широко использовал произведения Абулкосима Фирдавсий, Низомий Ганжавий, Жалолиддина Руми и других мыслителей, уникальные изречения народов Востока.

Научное значение произведений Хусейна Воизи Кошифи в том, что, в нём основательно разработаны правила воспитания, во вторых изложена профессиональная этика, в третьих необходимые правила поведения и безнравственные стороны для каждого владельца профессии, сотрудника изложены просто, и понятно. Так как, способ изложения произведений Кошифи является простым, ясным и понятным, они доступны для пользования широкой публикой. Кроме этого, научное значение научного наследия Кошифи является то, что его выдвигаемые идеи основаны на рационализме. Из-за этого, вот уже в течении более 5 веков произведения «Футувватномаи султоний ёхуд Жавонмардлик тарикати» и «Ахлоқи муҳсиний» Хусейна Воиза Кошифи приобретает важное значение в нравственном развитии народов Востока и в качестве бесценного, классического произведения занимает место среди произведений, которые читаются с особой любовью в каждом доме. В настоящее время в условиях сложной глобализации для формирования здоровой духовной атмосферы в семье, для обеспечения духовного совершенства членов семьи, для защиты нашей молодёжи от различных моральных угроз и формирования у них чувства национального самоосознания, а также для воспитания высоконравственного совершенного поколения научное наследие Хусейна Воизи Кошифи служит одним из важных теоретических источников.

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Information structure of society and the system of social action

Abstract: The article presents example of modeling information and communication structure of society: considered the main methodological problems of definition of the term, described the possibility of studying the information structure of social formations. Based on the model systems of social action T. Parsons and theory of communicative systems N. Luhmann the article describes the possibilities of modeling of the information structure of society. Described an example some of the information structure of social formations.

Keywords: information structure, information and communication space, generation of information, information interchange, social system, subsystem of social action.

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Информационная структура общества и системы социальных действий

Аннотация: В статье представлен пример моделирования информационно-коммуникативной структуры общества: рассмотрены основные методологические проблемы определения данного понятия, описаны возможности исследования информационной структуры социальных образований. На основе модели систем социальных действий Т. Парсонса и теории коммуникативных си-

стем Н. Лумана показаны возможности моделирования информационно-коммуникативных систем общества. Описывается информационная структура некоторых социальных образований.

Ключевые слова: информационная структура, информационно-коммуникативное пространство, генерация информации, информационный обмен, социальная система, подсистемы социальных действий.

Информационная структура социальной системы – это комплекс согласованно взаимосвязанных системных элементов, постоянно участвующих в информационных взаимодействиях и обладающих стабильными и относительно устойчивыми связями [6]. Информационная структура в социальной системе выполняет некоторые основные, жизненно необходимые задачи: способы генерации информации; распределение и использование (доступ) информации; сохранение и хранение информации; передача информации в окружающую среду (выброс информации) [2].

Первый компонент информационной структуры – генерация информации. С точки зрения теории информации, систем, кибернетического взгляда это основной компонент социальной системы, который определяет её информационные возможности, способность отражать и взаимодействовать с окружающей средой: основные способы видения мира, восприятие окружения и взаимодействие с ним; основные способы генерации того или иного типа информационных сообщений. Способы генерации информации формируются прежде всего, это то, что накоплено обществом в течение долгого существования и то, что является основой, базисом его коммуникативного пространства [3]. Компонент генерация информации является характеристикой социальной системы и соответствует инстинктивному блоку в модели информационной системы Осиповой-Дербас П.В. Исследователь при этом справедливо указывает, что на основании только лишь ядра социальной информационной системы невозможно существование ни одной системы, поскольку она будет слишком уязвима для окружения. Системе для существования требуются все возможные виды информационных сообщений и поэтому в социальной системе формируются и другие уровни, блоки, компоненты [4]. Генерация информации в социальных системах проявляется без всякого воздействия среды, тогда как остальные подсистемы (компоненты) должны

быть сформированы в процессе функционирования и образуются в процессе взаимодействия со средой.

Генерация информации соответствует коллективам – компонент, выполняющий функцию целедостижения [5]. Это непосредственные социальные субъекты системы, её ядро, действия, формирующиеся всей системой. У исследователя информационных процессов социальных систем Букалова А.В. генерация информации проявляется в ментальности этноса. Учёный определяет этнос как основу информационного пространства системы, которое включает в себя всю социальную структуру системы: социальные институты, соционормативную систему общества, организации, коллективы [1]. Именно данное информационное пространство является основой для формирования любых других подсистем действий [1, 8]. Это действия, продуцируемые системой и являющиеся её ядром, все остальные компоненты и подсистемы выполняют транслирующую или поддерживающую функцию для уже созданных информационных сообщений. Генерация информации соответствует и выражается в подсистеме личность – индивидуальные действия, определяющие действия коллективные. Это необходимые совместные действия или действия каждого, но в рамках согласованных действий коллективов. То, что определяет систему действий – личностные вклады каждого индивида в общее социальное пространство. Менталитет, общее сознание, генерация определённого вила информации – это механизм определения необходимых действий каждым из нас, без специальных шаблонов, без специального согласования.

Вторым компонентом информационной структуры является переработка и распределение информации. Это специально созданные структуры, функционирующие для распространения информации по социальной системе. С помощью данного компонента производится расчленение, разделение полученных информационных сигналов: отображение, закрепление и распространение сообщений в виде символов, знаков, шаблонов, это правила осуществления внешних взаимодействий. С помощью данного компонента формируются автоматические действия, стандартные клише в стандартных ситуациях [3, 231]. Букалов А.В. в собственной модели определяет данный компонент как торгово-промышленный строй, показывая тем самым, что созданная информация используется системой, но уже в качестве других видов информационных сообщений в целях внешнего управления, в целях адаптации к внешнему окружению. Вот почему уже на

этом уровне система не способна создавать собственные информационные сообщения и пользуется шаблонами.

Роли – это переменная, отражающая распределение информации по социальной системе; элемент выполняет адаптацию и определяет границы действий социальных субъектов, роли охватывают зону проникновения личности в коллективные действия. Это определенные модели действий, шаблоны, которые позволяют реализовать общую систему действий [5]. Это коммуникативные каналы, шаблоны информационных взаимодействий, позволяющие «раздать» созданные информационные сообщения по общему коммуникативному полю. Общее понимание ролей, которые играет каждый участник согласованных действий позволяет реализовать правила распределения ресурсов любого характера по социальной системе. Это шаблоны действий, распространяющие созданную информацию. Физическая среда как одна из подсистем социальных действий соответствует компоненту «роли». Является источником материальных ресурсов, которые используются обществом посредством своих производственных, технологических и экономических механизмов. Распределение доступа к материальным ресурсам (а для нас это распределение информации) выражается в территориальном, пространственном размещении социальных субъектов, закрепление за ними экономических интересов.

Третий компонент отражает структуры, сохраняющие информационные сообщения. Это социальные структуры, сохраняющие полезные системы знаний, обработанную информацию, которая необходима для выживания и функционирования всей системы. В модели информационной системы Л.В. Осиповой-Дербас соответствует интуитивному и рациональному блоку. С одной стороны, это структуры позволяющие, используя полученные данные, сформировать шаблоны действий для нестандартных ситуаций, с другой стороны – это использование сформированной системы знаний для осмысленного и осознанного внутреннего управления. В модели А.В. Букалова это государство и административный аппарат. Для Т. Парсонса это нормы, как переменные, отражающие одно из проявлений систем действий.

Нормы интегрируют социальные системы, конкретны и специализированы применительно к отдельным социальным функциям и типам социальных ситуаций. Это конкретные способы ориентаций для действий, конкретизированные применительно к соответствующим уровням в структуре социальной системы,

это совершенно определенные способы ориентации для действия в функциональных и ситуационных условиях, специфичных для определенных коллективов и ролей. Данный компонент относится к сохраняемой информации, это те виды информационных сообщений, которые необходимы для выживания системы, для её комфортного существования, для поддержания её целостности. Сама система не производит и не генерирует подобные виды информационных сигналов, но активно использует подобную информацию, полученную другими системами, стремится к ней, сохраняя именно данный вид информационных сигналов.

Нормы как компонент сохранения информации соответствует системе контроля общества - призваны сохранять систему, её стабильность, способность к контролю за внешним и внутренним обменом. Это способность предотвратить или пресечь нарушения действий (для нас – сохранённая информация, знания, то ради чего весь совершается весь информационный обмен).

Завершается модель информационными сообщениями, которые были созданы, но не использованы в процессе информационного обмена. Данные структуры определяют гомеостаз общества, позволяя компенсировать энергетические затраты, сохраняя, таким образом, систему в её естественном состоянии. Это отражение информации, утилизация информации, информационные отходы, освобождение системы от ненужной информации, защита от информационной перегрузки. Это ценностные структуры общества, позволяют осуществлять внешнее управление с использованием неосознанных, но сформированных шаблонов действий [3, 231]. Компонент представлен религиозными, культурными, духовными практиками, а также различными локальными социальными структурами (субкультуры, контркультура и т.д.). В качестве примера можно рассмотреть проведенное исследование ценностных ориентаций жителей г. Уфы и полученную модель [7].

В заключении можно сказать о том, что определение информационно-коммуникативного пространства как основного для социальных систем основано на постулатах теории систем, дополняет существующие положения и выводы относительно природы систем социальных действий. Исследование структуры, сущности и основ формирования информационных систем, информационно-коммуникативного пространства может определить особенности и характеристики той или иной социальной системы.

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A healthy lifestyle students by means of physical education

Abstract: Studied many years of experience with students on the formation of her healthy lifestyle means of physical training, considering a healthy lifestyle as a model form and methods of activities of daily living of students, strengthening and perfection of reserve capacity of the organism to ensure the successful implementation of their social and professional functions irrespective of political, economic, social and psychological situations. The analysis of the effectiveness of a healthy lifestyle for students.

Keywords: healthy lifestyle, students, efficiency, health, physical and moral qualities.

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Формирование здорового образа жизни студенческой молодежи средствами физической культуры

Аннотация: Изучен многолетний опыт работы со студенческой молодежью по формированию у нее здорового образа жизни средствами физической культуры, рассматривая здоровый образ жизни как типовую форму и способы повседневной жизнедеятельности студенчества, укрепляющие и совершенствующие резервные возможности организма, обеспечивающие успешное выполнение своих социальных и профессиональных функций независимо от политических, экономических и социально-психологических ситуаций. Дан анализ эффективности здорового образа жизни для студенческой молодежи.

Ключевые слова: здоровый образ жизни, студенческая молодежь, эффективность, состояние здоровья, физические и нравственные качества.

Сегодня главной проблемой современного общества является сохранение его здоровья. Современный ритм жизни, экологические проблемы, последствия технического прогресса оказывают негативное влияние на здоровье, в том числе и молодежи. Но существует еще и опасная тенденция к снижению мотиваций здорового образа жизни среди широкого круга населения, в том числе и среди молодежи, что способствует развитию движения среди педагогов, медиков и исследователей, направленного на поиск путей оздоровления общества, принятия здорового образа жизни [1; 6].

Как показала практика педагогов и исследователей важнейшим условием здорового образа жизни является оптимальный двигательный режим, основу которого составляют систематические занятия физическими упражнениями и спортом, которые эффективно решают задачи укрепления здоровья и развития физических способностей молодежи, сохранения здоровья и двигательных

навыков. При этом физическая культура и спорт выступают как надежные средства воспитания.

Анализ исследований и публикаций, результатов многих медико-педагогических экспертиз свидетельствует о наличии опасной ситуации со здоровьем школьников [2; 3; 7; 12; 13]. Статистика показала наличие разнообразных отклонений в состоянии здоровья каждого третьего ребенка ко времени поступления в школу, а уже в девятом классе каждый второй школьник является обладателем таких отклонений в состоянии здоровья. Так, от 10 до 20% современных школьников имеют лишний вес тела; от 30 до 40% - заболевания носоглотки; от 20 до 40% - нарушения осанки, а 50% школьников имеют дефекты зрения и нервно-психические отклонения; 50-60% - склонность к частым простудным заболеваниям, что объясняется увеличением количества многих хронических заболеваний, недостаточной двигательной активностью школьников в режиме традиционно организованной формы учебно-воспитательного процесса [14]. А такая категория школьников, пополняя ряды студенческой молодежи, автоматически ограничивает себя в двигательной активности с вытекающими последствиями.

Поэтому со студентами первых курсов всех факультетов университета ежегодно сентябрь месяц посвящается разъяснительной работе о роли здорового образа жизни для и укрепления здоровья студенческой молодежи, для развития их физических качеств, о роли спортивных секций в жизнедеятельности студенческой молодежи. А наглядная информация о работе спортивных секций университета способствует активному формированию их состава. Формы работы секций и регулярная демонстрация их результативности способствовали активизации интереса студентов, наполняемости секций и регулярности в их работе.

В данном сообщении представлены результаты исследований за последние три учебных года, где члены сформированных спортивных секций составили экспериментальную группу в количестве 268 человек (92 юноши и 176 девушек). Контролем служили студенты-однокурсники в количестве 120 человек (60 юношей и 60 девушек), отнесенные к основной медицинской группе, но в спортивных секциях не занимавшиеся.

После медицинского обследования студенты обеих групп прошли тестирование. У них сняли некоторые силовые показатели и показатели нравственных качеств по общепринятым методикам [5; 10; 11]. О силовых качествах студентов

судили по показателям силы правой кисти, становой силы, силовой выносливости, о которой судили по количеству отжиманий от пола у юношей и от гимнастической скамейки у девушек. О нравственных качествах студентов судили по их трудолюбию, по отношению к общественной собственности, по общественной активности [10; 11].

Учитывая, что совершенствование основных качеств физического развития человека происходит не в одинаковой мере, специалисты выстраивали учебно-тренировочный процесс соответствующим образом, уделяя особенно на первых порах больше внимания развитию и совершенствованию выносливости в сочетании с закаливанием и другими компонентами здорового образа жизни, что, по мнению медиков, обеспечивает организму занимающихся надежный щит против многих заболеваний.

Должное внимание уделялось ходьбе как сложному двигательному акту, который происходит при участии практически всего мышечного аппарата нашего тела. Ходьбу, как и нагрузки, можно точно дозировать и постепенно, планомерно наращивать по темпу и объему.

Учитывая, что систематическая ходьба оздоравливающе влияет на человека, улучшает самочувствие, повышает работоспособность, что ежедневное пребывание на свежем воздухе в течение 1-1,5 часа является одним из важнейших компонентов здорового образа жизни, руководители спортивных секций проводили активную пропаганду среди студентов и оказывали практическую помощь в организации для проживающих в общежитиях студентов пеших прогулок перед сном, давая возможность молодежи на практике убедиться, как такие прогулки снимают напряжение трудового дня, успокаивают и регулируют возбужденные нервные центры и дыхание.

Работа спортивных секций проводилась по общепринятым планам и программам [9]. В начале учебного года и в конце его проводили тестовый контроль уровня физических и нравственных качеств студентов, результаты которого были достоянием студенческой среды, а обработанные математически представлены в данном сообщении. Анализ полученных данных показал, что активизация всех составляющих здорового образа жизни студенческой молодежи проявилась в улучшении всех изученных показателей. Если изученные показатели студентов экспериментальной и контрольной групп до начала педагогического эксперимента не имели статистически достоверных различий, то уже через год

статистически достоверные различия имели место, проявляя более выраженное улучшение еще через год. Так, если становая сила у девушек экспериментальной группы, за первый год педагогического эксперимента, увеличилась на 9,8 % ($p = 2,26$), то на конец второго года педагогического эксперимента она превысила исходный уровень на 20,2% ($p = 3,08$). Увеличение показателя становой силы девушек контрольной группы составило соответственно 4,9% ($p = 1,87$) и 6,4% ($p=2,09$). Заметим, что динамика становой силы находилась в зависимости от вида спорта и составила 5,3 - 14,9%.

Динамика становой силы экспериментальной группы юношей была более выраженной и составила 18,5% ($p=2,98$) на конец первого года и 21,6 % ($p=3,54$) на конец второго года педагогического эксперимента по отношению к исходному уровню показателя. Увеличение показателя становой силы юношей контрольной группы составило соответственно 8,3% ($p = 2,18$) и 13,7% ($p =2,29$).

Аналогичная динамика наблюдалась и с показателем силы правой кисти, которая у девушек экспериментальной группы на конец первого года педагогического эксперимента увеличилась на 9,3% ($p=1,88$), на конец второго года педагогического эксперимента – на 17,3% ($p=2,28$), у юношей – соответственно на 16,6% ($p = 2,32$) и на 26,9% ($p = 3,11$).

Показатель силовой выносливости сохраняет ту же тенденцию, увеличиваясь у девушек на конец первого года на 14,2% ($p = 2,13$) и на конец второго года педагогического эксперимента – на 19,1% ($p = 3,14$), у юношей – соответственно на 22,4% ($p = 2,88$) и на 29,6% ($p = 3,31$).

Полученные нами результаты исследований подтверждают выводы других авторов [4; 5; 7; 8], касающиеся динамики физических качеств студенческой молодежи под влиянием физической культуры и спорта.

Два года соблюдения здорового образа жизни, регулярной работы в спортивных секциях университета оказали положительное влияние на некоторые нравственные качества. Так, заметно улучшился показатель трудолюбия студентов, их общественная активность. Убедительно улучшилось отношение студенчества к общественной собственности. Но ввиду отсутствия статистической достоверности обозначенных показателей изучение динамики нравственных качеств студенческой молодежи продолжается.

Таким образом, позитивная реакция студенчества на соблюдение здорового образа жизни дает возможность рекомендовать ВУЗам активизировать работу со студенческой молодежью по соблюдению здорового образа жизни, решая вопросы ее всестороннего развития.

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Frankofonia: Sociocultural Manifest of the Past to the Future

Abstract: This article examines «Francofonia» - a picture directed by Alexander Sokurov. The film was shown at 72 Venice International Film Festival. Multiple cultural and sociological aspects and features of the movie are described. The specificity of director's work on this film is examined. The conclusion on interaction between modern cinema and society is made.

Keywords: Alexander Sokurov, Francofonia, Venice International Film Festival, Louvre, culture, society.

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Франкофония: Социокультурный манифест прошлого к настоящему

Аннотация: В данной статье рассмотрена лента Александра Сокурова «Франкофония», показанная в рамках 72 Венецианского фестиваля. Описаны множественные культурологические и социологические аспекты фильма. Рассмотрена специфика работы режиссера над картиной. Сделан вывод о взаимодействии современного киноискусства и социума.

Ключевые слова: Александр Сокуров, Франкофония, Венецианский кинофестиваль, Лувр, культура, общество.

«Культура. Кто мы без нее? Чем бы мы были без музеев! Без Лувра нет Франции, как без Эрмитажа нет России!» - говорит закадровый голос режиссера «Франкофонии» (фр. La Francophonie) — международная организация сотрудничества франкоязычных стран мира. Девизом организации служит французское изречение «Равенство, взаимодополняемость, солидарность» (фр. «égalité, complémentarité, solidarité») [1] Александра Сокурова, обращаясь именно к зрителю, к обществу. «А что культура без нас...?» - многозначительно может парировать в ответ, и имеет полное на это право, само общество.

Представитель социологической школы США Толкотт Парсонс определяет культуру, как продукт, состоящий из моделей, относящихся к поведению и результатам человеческой деятельности, моделей, которые могут наследоваться от поколения к поколению независимо от биологических генов [2, с. 8]. Русский социолог Питирим Сорокин предлагает развернутое определение в рамках рассмотрения структуры социокультурного взаимодействия. Здесь он определяет три аспекта, неотделимых друг от друга: 1) *личность* как субъект взаимодействия; 2) *общество* как совокупность взаимодействующих индивидов с его социокультурными отношениями и процессами; 3) *культура* как совокупность значений, ценностей и норм, которыми владеют взаимодействующие лица, и совокупность носителей, которые объективируют, социализируют и раскрывают эти значения [3, с. 218]. Примеры такого взаимодействия продолжают появляться на свет, несмотря на существование внешних (культурных) и внутренних (общественных) обстоятельств. Все эти аспекты сосредоточились в «Франкофонии» - в одной кинокартине-памятнике, кинокартине-пророчестве. Картинае титулованного мастера кино - Александра Сокурова.

Творчество российского кинорежиссера Александра Николаевича Сокурова — феномен огромного и разнообразного художественного труда. Ни перипетии политики, ни требования масскультуры, ни, наконец, мощнейший стопор любого чистого искусства — деньги — не остановили его упорного движения к одному ему ведомой или ощущаемой цели. Его деятельность в России вызывает споры, но для всех его имя уже стало символом ответственности художника за свой дар. Сокуров снимал документальные и игровые кинофильмы, работал с видео и на радио, занимался литературной работой, и во всем, что он делал, присутствовал его неповторимый авторский голос. Его творчество плохо поддается формулированию, хотя ему посвящены сотни статей и несколько книг на

разных языках. Сокуров «выращивает» свои работы на перекрестке двух основополагающих традиций кино: документальности и художественного преображения от впечатлений реальности. Сделав за два с лишним десятилетия работы около сорока картин, он продолжает поиск собственно киноязыка, который, по его мнению, все еще не обретен столетним младенцем — кинематографом. Сокуров продолжает быть шокирующе непредсказуемым, оставаясь верным своей стилистике. Ее специфические авторские приемы: длительная протяженность планов — растянутое время смысловых акцентов, изощренность методов съемки и обработки материала, соединение документальных и игровых кусков, макета и природы, актера и непрофессионального исполнителя. Главное же для него — угаданная суть, онтологический драматизм личности, всегда обобщающий опыт поколения, эпохи, цивилизации [4].

Он врывается в репортажную структуру видео или кино изображения с волей сочинителя, со страстным вопросом собеседника и моралиста, он преобразовывает этнографические вехи в фантастические траектории заповедных путей к чужой культуре, к иному образу жизни — в поисках родственной — своей — души. В сущности, он художественно осваивает историю, географию, культуру, а более всего «мировую душу» [4].

«Франкофония» - последняя на данный момент лента Александра Николаевича буквально рассказывает, насколько культурно обогащена эта «душа» и насколько необходимо современному обществу в нее хоть иногда заглядывать.

Премьера фильма прошла в рамках 72 Венецианского кинофестиваля. Главный зал (примерно 1500 зрителей) «Зала Гранде» был почти заполнен интернациональной публикой. И это на полу-документальном фильме о музее. После того, как на экране появились финальные титры, публика стоя аплодировала режиссеру и актерам ленты на протяжении пяти минут. Овации продолжались бы намного дольше, если бы сам Александр Сокуров не прервал восторги, поклонился зрителям и направился в направлении выхода.

«Мне кажется, фильм не получился». Реплика и голос автора узнается безошибочно. На первых же кадрах «Франкофонии» зритель находится в некоторого рода замешательстве. Рефлексия и самокопание обычно не свойственны режиссеру такого уровня. Данная кинокартина очень несовершенна; но от этого не менее уникальна и увлекательна, как арт кино. Если фильм-предшественник «Франкофонии», самый оригинальный у Сокурова — «Русский ковчег», поражал

своей безмонтажной цельностью и кадром длиною во весь хронометраж, то история о французской цитадели искусства впечатляет эклектикой и свободой, дающими почву для своеобразной бравады. Лента создана из бинарных оппозиций: хроники и постановки, сценария и импровизации, политики и культуры, фактографии и неприкрытой фантазии. Анахронизмы, драматургия и даже юмор. Всего понемногу. Как и полагается в настоящем большом музее.

Фильм не вышел таким, каким должен был выйти, в сухом академическом понимании кинематографа. Прежде всего это произошло из-за отсутствия договоренности и доверия между Лувром и Сокуровым. По собственному признанию режиссера, дирекции Лувра не понравился ни сценарий, ни финальный результат. Тема — Франция времен немецкой оккупации — до сих пор неприятна и болезненна, что согласно автору, стало причиной, из-за которой «Франкофонию» не показали в конкурсе Каннского фестиваля. Тем не менее в Венецию, где даже главные здания фестиваля на острове Лидо остались от времен Бенито Муссолини, картину взяли без каких-либо вопросов.

«Франкофония» - явное авторское высказывание. Она действительно похожа на литературное произведение. В литературе можно напрямую обратиться к читателю. Именно литературе, как неотъемлемой части культуры, мы обязаны появлению практически всех пророков истории человечества. Совсем не случайно, автор обращается к Л.Н. Толстому и А.П. Чехову в начале ленты. Вот только писатели уже давно закрыли глаза на происходящее в обществе. Все решено, и в последствиях придется разбираться уже самому социуму. Фильм представляет собой единый монолог-размышление. Этому монологу, его свободной композиции следуют все остальные компоненты. Интонация монолога — крайне спокойная, слегка стеснительная: Сокуров не собирается становиться вровень с титанами, не хочет умничать и иногда кажется простодушным. Правда, это простодушие мудреца, способного почти банальным простым вопросом сокрушить все интеллектуальные построения оппонентов.

Данную ленту уже успели сравнить с потоками сознания позднего Годара, и «Обыкновенным фашизмом» Ромма. Почти целиком состоящий из хроники, монтажный ряд продиктован логикой размышлений Сокурова. Круг размышлений может расширяться как угодно далеко и потом будет продолжаться в головах зрителей, рождая огромное количество новых ассоциаций. Но неизменен куль-

турологический ракурс: искусство как свидетель и хранитель человеческой истории. Сокуров считает его выше и важнее идеологий и политических конструкций, которыми тешится мир. Оно постоянно подвергается набегам варваров, оно разрушается войнами, оно хрупко. Фильм начинается диалогом Сокурова по скайпу с неким капитаном Дирком, который сквозь бури ведет судно с мировыми шедеврами, и каждый миг оно грозит пойти ко дну. Метафора прозаична, голос капитана тает в штормовом эфире, но образ европейской цивилизации, шатающейся под смертоносными ударами века, читается ясно.

Лувр здесь - как цитадель, пока сумевшая устоять. Его коллекции собирались в ходе все тех же войн и завоеваний, и Наполеон лично курировал создание крупнейшего музея Европы. Вот появляется Марианна, символ Французской республики. Она бродит по Лувру, безостановочно бормоча: «Свобода. Равенство. Братство». Никакой монарх не способен отдавать себе отчет в отдаленных последствиях своих дел, и Сокуров много и остроумно иронизирует над человеком в треуголке, самодовольно мечущимся по залам, тыча пальцем то в монарха на осле, то в Мону Лизу и самодовольно восклицающего: «Это - я!». Настоящее испытание для Лувра наступит в 1942-м, когда гитлеровцы оккупируют Париж, и немецкий офицер Франц Вольфф-Меттерних с директором Лувра Жаком Жожаром, вопреки политической конъюнктуре, объединят усилия, чтобы сохранить принадлежащие цивилизации сокровища.

Эти немногие игровые новеллы с участием отличных актеров никак не контрастируют с хроникой, не смотрятся самостоятельно: оператор Брюно Дельбоннель, продолжив эстетику «Фауста», поразительно сумел вписать их в общий изобразительный ряд живописных полотен и документальных кинокадров, придав ленте общий приглушенный колорит, когда и фигуры живых людей уподоблены теням из прошлого (Как известно, для съемок своих фильмов Сокуров создал целую оптическую лабораторию, где изобретены специальные линзы, дающие этот эффект старой, выцветшей, с пятнами, хроники). Чтобы окончательно снять вопросы требовательных зрителей, по краю многих кадров «Франкофонии» змеится оптическая фонограмма - как на вышедшей в тираж киноплёнке.

Монолог не иллюстрируется этими разнородными и разновременными кадрами - он в них продолжается. У него логика свободно развивающейся мысли, способной перенестись от метафоры к историческому персонажу, из наполео-

новских времен в блокадный Ленинград и опустевший, превращенный в госпиталь Эрмитаж. Из факта сотрудничества гитлеровского офицера и директора Лувра вырастает тема глубинного братства европейских наций как носителей единого культурного кода - но из этого круга исключены Восточная Европа и Россия, и сокровища Ленинграда для тех же европейцев уже не входили в реестр первых ценностей. Я уже отмечал определенное - и даже культивируемое, принципиальное - простодушие многих ходов картины; так вот, именно здесь голос Сокурова звучит нескрываемой обидой. Тем более горестной, что и его родная Россия сейчас культивирует эту свою абсурдную отдельность и тоже хочет возвести ее в абсолют.

Можно сколько угодно обвинять Сокурова в тенденциозности, удивляться его смелым параллелям и оппозициям, критиковать попытки сравнить Эрмитаж и Лувр — но нельзя не признать очевидного: мы имеем дело с очень крупным и своеобразным художником, который не может обойтись одним лишь почтением к своему материалу. Чем сомнительнее и неожиданнее его методы, тем сильнее их воздействие. Захочет полетать над Парижем на бомбардировщике, а потом вдруг задержится у ассирийских крылатых быков — а ты послушно следи за его траекторией, жди новых сюрпризов.

Присвоенный трактователем шедевр в момент может стать плоской картинкой из учебника. Для многих, но не для Сокурова. Напротив, он безо всякого 3D добивается эффекта поразительной трехмерности, с такой любовью и задумчивым вниманием камера оператора скользит по каждому квадратному сантиметру выбранной картины или скульптуры. Они выше понимания или анализа кинематографа. Осознание этого автором странным образом придает «Франкофонии» иррациональное благородство сиюминутного, отступающего в присутствии вечного. Созданные средствами кино портреты двух мужчин, давно ушедших в небытие, но когда-то сохранивших для вечности коллекции Лувра, обретают ту глубину и загадочность, которой авторы фильма любят на лучших полотнах музея — тех лицах и фигурах из прошлого, которые, по мысли Сокурова, и содержат ДНК классической европейской культуры.

В какой-то момент закадровый голос достигает кульминационной близости к зрителю. «Я вам еще не надоел? Ну что же. Потерпите немного», - смущенно обещает голос. И зал смеется – каждый зритель в зале благодаря этой интимно-

сти чувствует себя немножко участником этого далекого и таинственного процесса – сохранения богатств Лувра, о которых так витиевато и увлеченно пытается рассказать Сокуров.

Самый трагикомичный, и от этого более лирический эпизод картины открывается под самый ее занавес: Сокуров приглашает француза и немца на своеобразную пророческую аудиенцию – на разговор по душам. Переглядываясь, они узнают свою будущую судьбу, о которой поведаёт им умудренный временем автор кинофильма. Александр Николаевич не упускает возможность подшутить над немецким полковником-опекуном Лувра, рассказывая его будущую судьбу и заметив, как изумленно вскинулись брови офицера вермахта при упоминании о скором поражении Германии. Сокуров ерничает: «Вы удивлены, что Германия проиграла войну? А когда она выигрывала?» Затем следует взрыв смеха на весь зал. Но главный посыл данной сцены пронзительно прост: вдруг, озарением, становится ясно, как мало уготовано нам свершить за свою жизнь, и каким значением вдруг проникается каждое ее действие, и как подобно песочному замку выстраиваются даже самые успешные судьбы. Чтобы, рассыпавшись, снова обратиться в песок. А Лувр, а Эрмитаж будут стоять назло всем временам. Пока они не обратятся в прах после какого-либо катаклизма или удовлетворения амбиций сильных мира сего. Культурное взаимодействие, превратившиеся во взаимопонимание между двумя представителями враждующих стран, все равно было достигнуто большой ценой, хотя платили ее и не французы, считает автор. В то же время музеи Восточной Европы и в частности большевистской России были подвергнуты беспощадному разгрому, в котором спасти удалось далеко не все шедевры. К сюжету это прямо не относится, но для Сокурова параллель оккупированного «Парижа, открытого города» с блокадным Ленинградом — едва ли не важнейшая в фильме.

В аннотации к фильму, размещенной в официальном каталоге 72 Венецианского кинофестиваля, Сокуров не спешит с препарированием ситуации с Лувром и обличением главных героев, персонифицирующих соответствующие страны: *«Европа всегда казалась мне некой крепкой, многолетней, сплоченной семьей со сложившимися традициями. Культура является основой данной семьи. Европейские страны создали грандиозную и выдающуюся культуру, в которой музыка, живопись и литература в какой-то степени однородны. И я*

твердо верю, что Франция и Германия...почти как сестры. У каждой свой характер, они иногда спорят, и их отношения всегда сложны. Наш фильм сосредоточен на успешном аспекте их отношений. В описываемом временном промежутке двум нашим героям удастся прийти к пониманию...» [5, с. 79].

Далее монолог обрывается. И в аннотации и в фильме. Иногда и слова не нужны: не будет взаимопонимания - не будет ничего. Громкие политические лозунги и грамотные стратегии будут ни чем иным, как теоретической базой и сотрясением воздуха. Такими же бессмысленными какофониями, как угасший гимн о нерушимом союзе республик свободных в конце ленты на багровом, ближе к черному, фоне. Как лунатически повторяемая в фильме, великолепная по смыслу триада: свобода - равенство – братство.

Главный посыл картины заключается в неизбежности компромисса, без которого не способно выжить искусство. Также если культура оказывается вне власти и политики, она представляется как совершенная утопия. Основная завязка истории картины состоит в конфиденциальном уговоре между директором Лувра Жаком Жожаром и представителем оккупантов Францем Вольффом-Меттернихом в 1940-ых годах, которые совместными усилиями сделали все, чтобы уникальная коллекция музея не была разграблена и разрушена, а сохранилась в неприкосновенности до наших дней. Всего из Лувра было вывезено 5 446 контейнеров с важнейшим содержимым - культурным наследием. Все произведения искусства были впоследствии спрятаны в 83 тайных местах.

Но помимо различных имплицитных смыслов, которые не спешит нивелировать режиссер, есть и информация из первых уст. По словам Сокурова, его фильм о попытках спасти музей от нацистов не только о Лувре, и не только о 40-х. Он также и о дне сегодняшнем, об ИГИЛ, разрушающем Пальмиру, обо всех, кто хочет уничтожить и властвовать. *«История ничему нас не учит... Никто не думает защищать нашу культуру. На то, что произошло в Пальмире, не осмелились бы даже нацисты...»* - каждая из этих фраз, полная горечи и боли, могла бы стать эпиграфом к его «Франкофонии». Фильму, где нет ни слова о разрушенной Пальмире, стертом с лица земли Нимруде и о «варварах XXI века», зато есть оккупированный нацистами Париж и заключенные в деревянные ящики сокровища Лувра. Но такой художник, как Александр Сокуров, смог, говоря о прошлом, заставить думать о настоящем и задаваться вопросом, а кем бы мы были без этих лиц, этих взглядов из других эпох [7].

Каждая культура определяет свою парадигму того, что следует помнить (т.е. хранить), а что подлежит забвению. Последнее вычеркивается из памяти коллектива и «как бы перестает существовать». Сменяется время, система культурных кодов, и меняется парадигма памяти-забвения. Античные статуи находили и в доренессанскую эпоху, но их выбрасывали и уничтожали, а не хранили [6, с. 675].

События Второй мировой и «культурная чистка», которая также входит в «концепт» культуры исламистов сегодня. Была ли для Сокурова эта аналогия такой явной четыре года назад, когда началась работа над фильмом, — вопрос без ответа. Ясно одно — еще до того, как показательные «казни» произведений искусства стали массовыми, у него — режиссера и мыслителя — появилось ощущение, что о спасении музея-символа Европы должны узнать миллионы. Француз и немец, демократ и аристократ, директор Лувра Жожар и граф Вольфф-Меттерних, отвечавший в нацистской армии за судьбу культурных ценностей. Спасение Лувра стало делом их двоих. В 1939 году Жожар буквально провел спецоперацию - по его приказу скульптуры и более 3,5 тысяч картин вывезли и спрятали в замках Луары. А в 40-м Меттерних, рискуя карьерой, обошел директиву Гитлера вернуть сокровища в Париж. Но найдутся ли такие спасатели сегодня и долог ли путь от Пальмиры до Лувра? Сокуров не спрашивает напрямую, но будто бросает мостик между эпохами. В кадр попадает картина «Плот Медузы» Теодора Жерико. На полотне - плот с пассажирами из Сенегала, терпящий крушение. Это режиссер подводит к болевой точке всей Европы: *«Эти толпы, идущие по Европе, да у меня не было того праздничного настроения, которое я видел внутри кадра. Когда австрийцы или немцы аплодировали там. Их встречали как победителей этих людей. Я в большей части среди них видел молодых мужчин, молодых людей. И я спрашивал: а у вас там Родина за спиной осталась? Кто будет решать ваши вопросы? И опять европейцы, итальянцы, французы, немцы... Кто будет решать сирийский вопрос? Кто будет решать ваши проблемы вашей Родины, вашего Отечества?»* - задает вопросы Александр Сокуров [7].

Иностранная публика, встретившая «Франкофонию» необычайно тепло, несмотря на заявления режиссера на пресс-конференции после показа фильма

журналистам: *«Я пытался своим фильмом вложить вам что-то в души. К вашему разуму обращаться бессмысленно – он давно спит»*, - уличал журналистов Александр Николаевич.

О возможности победы фильма Сокурова в венецианском конкурсе писали международные кино-обозреватели. Было понятно, что он стабильно будет в фаворитах старейшего кинофестиваля. С другой стороны, автор арт-документального фильма всего три года назад увез «Золотого льва» за свою экранизацию «Фауста», и далеко не факт, что жюри под председательством мексиканца Альфонсо Куарона решится удостоить высшей награды Венеции одного и того же режиссера дважды. Но при таких рассуждениях все доводы насчет объективности фестивалей также ничего не стоят. И искусство уступает место очередному политическому ходу. В итоге главный приз фестиваля получила картина венесуэльского режиссера Лоренцо Вигаса «Издалека» про однополую любовь между мужчинами, молодым и не очень. Сокуров ограничился лишь призом критиков Европы и Средиземноморья Federa: *«Фильм Сокурова «Франкофония» - сложное кино, исследующее тему европейской культуры в привлекательной, хотя порой противоречивой поэтической манере»*, - говорится в сообщении оргкомитета премии [8]. И это при самых высоких рейтингах фильма от профессиональных кинокритиков. Рейтинг «Франкофонии» - 4.0 (Мировая критика – 3,83) рейтинг «Издалека» - 2.8 (Мировая критика – 2,60) [9, с. 7].

Фильм Сокурова был главным претендентом, в отличие от фильма-победителя, который к последнему фестивальному дню находился на 17 месте из 21 [9, с. 7].

«Серебряный лев» (за лучшую режиссуру) достался аргентинцу Пабло Траперо за фильм «Клан» - историю о похитителях и убийцах богатых людей, основанную на реальных событиях в 80-ые годы в стране режиссера. Можно рассуждать логически и оправдать распределение главных призов симпатией Куарона к южно-американскому кинематографу. Или открытием большого пути для молодых режиссеров. А можно бесконечно винить председателя жюри в субъективном и неоднозначном отношении к России, являющейся родиной Александра Сокурова.

Однако не следует забывать достаточно известный факт: «Франкофония» в конкурсе 72-го Венецианского кинофестиваля значился как франко-германско-голландский. В соответствии с вложенными средствами. Россия, будь то

Министерство культуры РФ или Государственный Фонд кино, денег на фильм не давала. Это устоявшийся принцип. Принцип «культурной» политики государства, не взаимодействующий с деятелями, которые не хотят разменивать талант на сомнительный псевдопатриотизм, кто не желает работать для так называемого «обычного зрителя» и соглашаться рассматривать кино как аттракцион, предлагающий зрителю нужную, на данном этапе, идеологию и забирающий за такой дар его деньги. И это – проблема уже не Сокурова. Сегодня снимать необычное гуманитарное кино в России настолько не в тренде, что даже пытаться просить на него деньги бессмысленно. Слишком многие деятели кино зависят от конъюнктуры и политики. Партийность искусства никуда не делась. Социальные и политические заказы, согласно директиве Л.Д. Троцкого и его статье «Партийная политика и искусство» (1923), работам А.В. Луначарского «Классовая борьба в искусстве» (1929) и «Художественная литература – политическое оружие» (1931) [10, с. 473], успешно функционируют и в настоящее время, получая все большее развитие. Развитие вполне очевидного характера.

Президент России Владимир Путин подписал указ о проведении в 2016 году Года кино. «В целях привлечения внимания общества к российскому кинематографу постановляю провести в 2016 году в Российской Федерации Год российского кино», - говорится в документе [11]. В связи с этим правительству РФ поручено образовать организационный комитет и утвердить его состав. Кроме того, кабинет министров должен обеспечить разработку и утверждение плана основных мероприятий по проведению Года российского кино. Органам исполнительной власти регионов РФ рекомендовано оказать поддержку серии культурных мероприятий. Исходя из этого, Государственный Фонд кино и Министерство Культуры РФ пытаются убедить крупнейшие российские сети кинотеатров подписать соглашение о добровольной квоте по показу отечественных фильмов, рассказали «Ведомостям» руководители четырех таких сетей. Для начала чиновники предложили кинотеатрам, чтобы те в 2016 г. отдали под русское кино не менее 25% сеансов в целом по году и не менее 15% в месяц [12]. Также подписано соглашение, согласно которому российские кинотеатры «приложат максимальные усилия» для показа отечественных фильмов в объеме не менее 20 процентов экранного времени в год. Соответствующий документ подписан между

Министерством культуры РФ, Фондом кино и некоммерческим партнерством «Киноальянс», в которое входят крупнейшие российские киносети, в частности «Люксор», «Пять звезд» и «Синема стар».

Также Министерство культуры РФ, Фонд кино и «Киноальянс» подписали еще одно соглашение, направленное на пропаганду российского кино. Так теперь в отечественных кинотеатрах перед каждым сеансом будут демонстрироваться социальные ролики, пропагандирующие российское кино.

Несмотря на кажущиеся радужные перспективы для отечественного кино, совершенно ясно, какого формата будут фильмы. Что нужно зрителю? Голосовать рублем за искусство и созидать? Как бы не так. Без хлеба и зрелищ конечно нельзя, но ограничиваться ими в современном развитом социуме было бы слишком опрометчиво. «Франкофония» была куплена для российского проката спустя пол года, после показа во многих странах Европы и получила мизерное количество прокатных копий по стране, в результате чего, была показана лишь в нескольких городах РФ. Политика «коммунизма разума и души» побеждает. Нет пророка в отечестве своем, потому что они, пророки и провидцы, нам нужны лишь в рамках шоу на телевидении. «Равенство, взаимодополняемость, солидарность»... полная унификация общества. И настанет тот день, когда данное общество задастся вполне закономерным вопросом: «Если искусство ничего и никому не должно, должны ли мы ему что-то?»

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Corruption as a Natural Result of Created Legal Preconditions (Conditions)

Abstract: In article the impact of legal prerequisites promoting and provoking of representatives of state institutions to commit corruption is examined. A number of good governance were revealed.

Keywords: law, corruption, human rights, criminology, administrative procedures, the right function, responsibility, good governance.

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***Коррупция как закономерный результат
создания правовых предпосылок (условий)***

Аннотация: В работе исследуются вопросы влияния правовых предпосылок (условий) способствующих и провоцирующих представителей государственных институций к совершению коррупционных действий. Выявлено ряд условий для надлежащего государственного управления.

Ключевые слова: право, коррупция, права человека, криминология, административные процедуры, функции права, ответственность, надлежащее государственное управление.

Постановка проблемы. Показатель распространенности коррупции (The Corruption Perceptions Index 2015 – индекс восприятия коррупции) в соответствии с исследованиями Международной неправительственной организации Transparency International [1] свидетельствует, что Украина занимает 130 место, из 168 возможных. Показатель свидетельствует о: стагнации экономики, национальной правовой системы, доминировании административно-командной экономической системы и постулатов советской правовой науки, нарушении конституционных прав человека, демографическом кризисе, падении уровня общественного доверия к деятельности коррумпированной «триады» – парламенту, исполнительным и судебным органам. Совокупность негативных аспектов является реальной угрозой национальной безопасности государства и дает основания для проведения научных исследований в сферах криминологии и административно-правовой науки.

Анализ последних исследований и публикаций. В украинской науке криминологии и административном праве отсутствуют работы, которые бы конкретизировали сущность правовых предпосылок (условий), способствующих совершению коррупционных действий представителями государственных институций.

Постановка задачи – осуществить анализ криминологических исследований и действующего законодательства, выявить причинную связь правовых предпосылок (условий) с коррупцией.

Изложение основного материала. В. Фокс, известный американский ученый, в книге «Введение в криминологию» [2, с. 37, 38, 309, 279, 280, 281, 284] акцентирует внимание, что право является отражением как культурных ценностей, так и существующих в обществе проблем. Право, отмечает автор, пред-

ставляет собой четко очерченную систему прав и обязанностей, предназначенную для универсального применения и устанавливающую способы принудительного осуществления своих норм, а также порядок разрешения споров. Действующее право сочетает систему юридических норм как отражение ценностей культуры с индивидуальными особенностями людей, участвующих в процессе принятия решений, применении юридических норм и осуществлении справедливости. Правовые запреты, объявляющие определенное поведение преступным, появляются только тогда, когда возникает необходимость при помощи таких запретов обеспечить порядок или произвести определенные изменения в обществе. Любое отклонение от ожидаемого поведения, приносящее вред обществу (группе) может быть определено как преступление. В. Фокс делает вывод, что преступление – это правовое определение недопустимого поведения или группы, которое столь существенно отклоняется от ожидаемого поведения, что нарушает нормальное функционирование общества или традиционные представления и чувства.

Первые попытки выявить связь преступности с социальными условиями современного им общества делали древнегреческие мыслители. Так, Аристотель (384-322 до н. э.) разработал концепцию сдерживания преступности, которая включает социальные факторы: справедливое государственное устройство; стабильность законов; беспрекословное их главенство над должностными лицами. Борьбу с коррупцией Аристотель рассматривал как основу обеспечения государственной стабильности: «Самое главное при всяком государственном строе – это посредством законов и стабильного распорядка устроить дело так, чтобы должностным лицам невозможно было наживаться». Отклонения от справедливости в государственном строе философ считает главной причиной крушения государств. Аристотель обращает внимание на то факт, что предусмотрительный законодатель должен сдерживать дурные инстинкты угрозой наказания, более сурового по сравнению с выгодой и удовольствием, которое может доставить преступление. Знаменитый древнеримский юрист Цицерон (106-43 до н. э.) высказал ряд криминологически важных идей. В частности, среди факторов, оказывающих предупредительную роль, он указывал на исключительную важность неизбежности наказания (надежда на безнаказанность является одной из сильнейших побудительных причин к совершению преступлений). Шарль Монтескье (1689-1775) в сочинении «О духе законов» изложил ряд фундаментальных идей,

которые во многом определили развитие криминологии, – о факторах преступности, о примате предупреждения, о роли социальных институтов и т.д. Он отмечал, что мудрый законодатель заботится не столько о наказаниях за преступления, сколько о предупреждении преступлений. Кроме того, Монтескье заложил основы «теории факторов». К ним он относил, в частности, образ правления, законодательство. Чезаре Беккариа (1738-1794) в сочинении «О преступлениях и наказаниях» (1764 г.) указывал: наказания должны быть одни и те же как для знатных, так и для обыкновенных граждан (принцип равенства перед законом); законы должны приносить благо не классам, а людям.

По мнению авторов учебного пособия «Криминология» [3] в Украине, начиная с 70-х годов прошлого века сформировалось понимание криминология, как общественной социолого-правовой науки и междисциплинарной комплексной дисциплины. Криминология – это социолого-правовая наука, которая изучает преступность, причины и условия преступности, пути и средства ее предупреждения, а также личность преступника [3, с. 6, 7]. Анализируя конкретные жизненные ситуации, которые могут находиться в различных звеньях механизма преступного поведения и играть определенную роль, ученые акцентируют внимание, что ситуация может означать создание условий для удовлетворения мотивов поведения и достижения той или иной цели [3, с. 100]. Для выявления условий следует использовать методику способов сбора, обработки, анализа и синтеза информации, в частности – анализ процедур разрешительной системы [3, с. 10]. Мы поддерживаем точку зрения ученых, которые акцентируют внимание на взаимосвязи роста преступности с существованием таких фактов: живучесть административно-командной экономической системы породила преступность и будет порождать ее там, где подобная система будет существовать [3, с. 118]; среди «наглых причин», порождающих наиболее резкую реакцию человека, авторы называют политические интересы и конфликты, поскольку влияние преступных политиков на общую преступность очевидна, как очевидно и то, что действие политиков, их программы и призывы формируют атмосферу в обществе и общественную психологию [3, с. 120]. В числе причин и условий преступности в перестроечный и постперестроечный периоды авторы называют четыре подсистемы: экономические причины и условия; причины и условия криминальной агрессивности; причины и условия криминальной неосторожности; правовые

причины и условия. В частности, под экономическими условиями авторы называют: ошибки в стратегии и практике экономических реформ, бесконтрольность, безнаказанность. В числе правовых условий: некачественное законодательство; негативы правоприменительной практики; неэффективность правового воспитания [3, с. 124]. Коррупция в государственном аппарате, ненадлежащая деятельность правоохранительных органов создают условия для беспрепятственной противозаконной деятельности, а это в свою очередь, ведет к росту преступности и сокращению законных путей достижения общественно приемлемых целей [3, с. 101].

Коррупция в Украине активно заявила о себе после принятия Декларации о государственном суверенитете Украины (16.07.1990 г.). Под лозунгами создания «многоукладной социально-ориентированной рыночной экономики», как отмечает С.С. Овчарук, властью одобрены Концепция разгосударствления и приватизации предприятий, земли и жилищного фонда. Начиная с этой даты «состоялся коллапс коммунистической системы «общенародной собственности и народовластия» в виде жесточайшего административно-принудительного отчуждения народа от любой собственности и, самое главное – от любого участия граждан Украины в государственном управлении. Все завершилось аферой с имущественными сертификатами и «прихватизацией» в пользу новой номенклатуры, включая представителей КПУ и криминалитета» [4, с. 251].

В свое время В.Д. Катков, известный правовед, указывал, что понятия юриспруденции чрезвычайно просты, трудности создаются искусственно, исходным их пунктом является двузначная терминология [5, с. 3].

Негативным аспектом ст. 6 Конституции Украины [6], в частности, является то, что представители «триады» наделены совокупностью понятий «власть» и «полномочия», что не есть синонимом институтам «обязанность» и «ответственность». В этом отношении Конституция 1996 г. дублирует идеологические положения конституций 1918 г. (Украинская Народная Республика), 1937 и 1978 г. (Украинская Советская Социалистическая республика). Безнаказанность чиновников усугубляется нормой ст. 56 Конституции Украины, согласно которой они освобождены от возмещения материального и морального вреда, вследствие их незаконных решений, действий или бездействия. Возмещение вреда осуществляется за счет государства или органов местного самоуправления, то есть

за счет тех же налогоплательщиков. Более того, Кодекс административного судопроизводства Украины закрепил норму, согласно которой юрисдикция административных судов не распространяется на «публично-правовые дела» о наложении административных взысканий [7, п.п. 3 ч. 3. ст. 17]. То есть, чиновнику-коррупционеру гарантируется абсолютная безнаказанность на основании принципа «верховенства закона коррупционеров». И не менее негативный фактор из перечня причин и условий, которые способствуют коррупции в государстве. Так, в Украине сегодня насчитывается: министерств – 17, государственных служб – 23, агентств – 9, инспекций – 8, иных центральных органов – 3, центральных органов с специальным статусом – 5, национальных комиссий – 4, а всего 69 административных органов [8]. Все они наделены правом нормотворчества в отношении разработки ведомственных процедур (правил) осуществления лицензионных, регистрационных, разрешительных и иных процедур (чему способствуют многочисленные нормативно-правовые акты). Закон об унифицированной административной процедуре, обязательный для исполнения всеми административными органами, как это, например, с 1946 г. регламентируется законом США про административную процедуру [9], в Украине отсутствует по причине активного противодействия чиновничества, представителей академической среды.

Как мы видим, недостатки и юридические коллизии конституционных и законодательных норм являются серьезным правовым барьером для: осуществления надлежającego государственного управления в соответствии с принципами правого государства и верховенства права, искоренения правовых предпосылок (условий) способствующих коррупции.

Вышеизложенное дает основания сделать такие выводы:

1. Коррупция является закономерным результатом незаконной деятельности представителей «триады»; интересам общества и государства противопоставляются интересы чиновничества, задачей которых является сохранение, дополнение, видоизменение правовых предпосылок (условий), позволяющих и далее осуществлять незаконные действия.

2. Предпосылки (условия), обеспечивающие: ненаказуемость коррупционных действий, узаконение древнего института «кормления»; создание благоприятных условий для коррупции и ненаказуемости чиновничества как правило создается за счет незаконных юридических норм и процедур, легализируемых законодателем в законодательных актах в пользу чиновничества. Доказательством

этому, например, служит узаконение нормы, согласно которой юрисдикция административных судов не распространяется на «публично-правовые дела» о наложении административных взысканий.

3. Создание условий для надлежащего государственного управления, в том числе и для устранения правовых предпосылок (условий), способствующих (провоцирующих) представителей государственных институций к совершению коррупционных действий, требует закрепления на конституционном уровне жесткой юридизации правового статуса служащих административных органов, что в значительной степени создаст соответствующие предпосылки (условия). Логичными и целесообразными являются меры относительно: лишения служащих административных органов права осуществлять «правосудие».

4. Потребность общества и государства в устранении правовых предпосылок (условий) назрела давно и возможна при условии приведения конституционных и законодательных положений в соответствие с требованиями правового государства, Резолюциями Парламентской Ассамблеи Совета Европы № 1466 [10] и № 1755 [11] (далее ПАСЕ). Резолюциями констатируется, что реформы во многих сферах сдерживаются существующими конституционными положениями, вследствие которых создаются препятствия для внедрения реформ, необходимых для выполнения Украиной своих обязательств перед ЕС. Для обеспечения долговременной стабильности в государстве, отмечает ПАСЕ, требуется осуществление конституционных изменений, согласно которых будут установлены четкое разделение власти, введение надлежащей системы сдерживания и противовесов между и внутри исполнительной, законодательной и судебной ветвями власти и т.п.

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The content of the ethno-cultural pedagogical education in Kazakhstan

Abstract: This article is dedicated to the issues of ethno-cultural education in the conditions of multilingual environment, it is necessary to preserve and develop cultures of the peoples of Kazakhstan.

Keywords: ethnicity, ethnic and cultural education, cultural policy concept.

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Содержание этнокультурного педагогического образования в Казахстане

Аннотация: Данная статья посвящена вопросам этнокультурного образования в условиях полиязычной среды и необходимости сохранения и освоения культур народов Казахстана.

Ключевые слова: этнос, этнокультурное образование, концепция культурной политики.

Одним из приоритетных направлений воспитательной работы в системе непрерывного образования Республики Казахстан выделяется «гражданско-патриотическое, правовое и поликультурное воспитание», которое «должно формировать гражданскую позицию и патриотическое сознание, правовую и политическую культуру, развитое национальное самосознание, культуру межнациональных отношений, социальную и религиозную толерантность, основанные на гу-

манизме, любви и уважении к языку, истории и обычаям казахского народа, сохранении и развитии его лучших традиций, изучении, приятии и освоении культур других народов Казахстана» [1].

Н.А. Назарбаев придает большое значение современному образованию и культуре. «Конкурентоспособность Казахстана должна привести не только к материальному, но и к духовному обогащению нации. За процветанием экономики должны последовать расцвет культуры и искусства, родного языка, традиций и жизненной философии нашего народа. Но в глобальном мире необходимо жить, уважая культуру и традиции других народов» [2].

Содержание современного педагогического образования во многом определяется перспективами, обозначенными Президентом Республики Казахстан Н.А. Назарбаевым «следует дать новые импульсы развитию всеказахстанской культуры. Следует разработать долгосрочную Концепцию культурной политики. В ней надо обозначить меры, направленные на формирование конкурентоспособной культурной ментальности казахстанцев, развитие современных культурных кластеров» [3].

Устойчивое развитие общества обеспечивается, в первую очередь, определением содержания образования, направленного на сохранение и развитие культуры. В Концепции устойчивого развития РК данное направление считается одним из приоритетных: «устойчивое развитие культуры и информационной политики в казахстанском обществе будет обеспечено путем:

- принятия мер по сохранению палеонтологических, археологических и архитектурных памятников и культурного наследия Казахстана, имеющих общенациональное и всемирное значение;
- пропаганды лучших достижений казахстанской культуры и искусства на международном уровне;
- поддержки общезначимых направлений отечественной культуры, в первую очередь киноискусства, народной и симфонической музыки, айтыса, драматического театра, оперы и балета, изобразительного искусства;
- повышения патриотической направленности и профессиональной культуры в работе средств массовой информации» [4].

Во Всемирной декларации о высшем образовании для XXI века отмечается, что «образование является важнейшей опорой прав человека, демократии, устойчивого развития и мира. ... В этих условиях решение проблем, с которыми

мы сталкиваемся на пороге XXI века, будет определяться мировоззрением будущего общества, а также той ролью, которая отводится образованию в целом и высшему образованию, в частности, осознавая, что на пороге нового тысячелетия высшее образование призвано отстаивать ценности и идеалы культуры мира и что для этого необходима мобилизация интеллектуального сообщества, принимая во внимание, что существенное изменение и развитие высшего образования, повышение его качества и адекватности, а также решение основных проблем, с которыми оно сталкивается, требуют активного привлечения... всех заинтересованных лиц» [5].

В Государственном общеобязательном стандарте образования Республики Казахстан (Высшее образование) предъявляются требования к результатам обучения и уровню подготовки выпускников:

Требования к социально-этическим компетенциям:

- знать социально-этические ценности, основанные на общественном мнении, традициях, обычаях, общественных нормах и ориентироваться на них в своей профессиональной деятельности;
- соблюдать нормы деловой этики, владеть этическими и правовыми нормами поведения;
- знать традиции и культуру народов Казахстана;

быть толерантным к традициям, культуре других народов мира [6].

На основании вышеизложенного, построение содержания этнокультурного педагогического образования основывается на общедидактической теории четырехкомпонентного состава общего образования. Исходя из этой теории, строится четырехкомпонентная структура содержания этнокультурного педагогического образования: развитие социокультурной идентификации студента как условие понимания и вхождения в этнокультурную среду; овладение основными понятиями, определяющими разнообразие мира; воспитание эмоционально положительного отношения к разнообразию культур; формирование умений, составляющих поведенческую культуру мира.

Содержание этнокультурного педагогического образования ориентировано на создание условий для социально-культурной идентификации личности, которая определяет ее статус при участии в межкультурном диалоге и обеспечивает ее первичным опытом изучения культуры; на формирование представлений

о культурно-этнической многообразии мира как в пространстве, так и во времени; на воспитание терпимости и уважения права каждого народа сохранять свою культурную самобытность; на оснащение студентов понятийным аппаратом, который обеспечивает возможность наиболее полного описания этнокультурной среды; на обучение студентов технологиям реконструкции ценностей культурных общностей, участвующих в диалоге, что является первым шагом к пониманию мотивов, установок и предубеждений участников диалога культур; на развитие у будущих педагогов способностей к критическому освоению поликультурной реальности.

При отборе содержания образования этнопедагогической культуры будущих педагогов профессионального обучения следует учитывать:

- социокультурное окружение студентов;
- индивидуальные интересы студентов к проблемам поликультурного общества в целом или отдельных социокультурных групп;
- изменяющуюся социокультурную ситуацию в регионе (процессы сближения стран, этнических и конфессиональных групп);
- этнические, социально-экономические особенности региона;
- методологические, методические и личностные возможности как каждого отдельного педагога, так и всего педагогического коллектива.

Специфика методов этнокультурного образования определяется диалоговым характером функционирования и развития культуры, уровнем этнокультурной идентификации студента, уровнем знаний о поликультурной среде, их эмоциональной и поведенческой культурой. Исходя из целей формирования этнопедагогической культуры будущих педагогов профессионального обучения, все многообразие методов можно свести к четырем группам:

- методы актуализации социокультурной идентификации и целеполагания;
- методы получения новых знаний и практических умений и навыков;
- рефлексивные методы;
- методы моделирования и проектирования деятельности [7]).

Технологии поликультурного образования предполагают:

- отношение к образованию как к культурному процессу, движущими силами которого являются диалог и сотрудничество его участников;

– отношение к учебному заведению как к целостному поликультурному пространству, где живут и воссоздаются культурные образцы совместной жизни.

Таким образом, этнокультурное образование составляет интегративную часть общего педагогического образования и ориентировано на формирование индивида, готового к активной созидательной деятельности в развивающейся среде, сохраняющего свою социально-культурную идентичность, стремящегося к пониманию других культур, уважающего иные культурно-этнические общности, умеющего жить в мире и согласии с представителями разных национальностей, рас, верований.

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The phenomenon of sexual addiction - selected aspects

Abstract: In the article the analysis of selected aspects of sex addiction. The authors focused on the analysis of the definition and diagnostic criteria for addiction to sex. It also examines the etiology of sex addiction and the effects associated with this phenomenon. The authors discuss the problem of model most optimal therapy for people addicted to sexual.

Keywords: behavioral addiction, addiction to sex, diagnostic criteria of addiction, addiction therapy.

Introduction

The phenomenon of addiction is perceived more and more as a kind of addiction belonging to the category of addiction without substance, that such pathological behavior that are associated with objects or activities (gambling, work, food, etc.). The need for more thorough interest in the problem of sex addiction indicates the fact that recently more and more often we have to deal with the manifestations of this phenomenon [11]. Therapists emphasize that many people who are struggling with sexual addiction, in fact, refers very big success in various areas of life. Those who struggle with unwanted thoughts and sexual behavior are, among others, business leaders and social, politicians, lawyers, doctors, artists and people involved many other important social positions [14].

Suggested scale prevalence of sexual addiction is growing. The incidence of sexual addiction is growing at a rapid pace [5]. It is estimated that 17 to 37 million Americans have a problem with this kind of addiction [2], [2], [6] [16], [24].

Sexual addiction is growing, partly because of the affordability, accessibility and anonymity of materials about the content available on the Internet [6].

There is no true "standard" for the frequency of sexual relations, but taking certain forms of behavior of a sexual nature and their intensity and coercion in this connection may cause serious difficulties for the individual and social functioning, and even, as the experiences of therapeutic, in many cases lead the dramas of life of people affected by this problem.

Definition and symptoms of sex addiction

Addiction to sex is manifested in excessive intensity needs and sexual behavior, causing negative effects in the dimension of somatic, psychic and social. Sex addiction is defined as repeated, ever-increasing patterns of sexual thoughts and behaviors that lead to negative consequences for addicts and for those around them [15]. The researchers of this problem point out that in the case of sex addiction, in addition to high intensity sex life and increased demand for sexual contacts, there are also disturbance of impulse control; exploration and grooming are still new partners; making intercourse in many circumstances, even unfavorable ago; the need to live the tension in situations of extreme risk; persistent desire to confirm their own sexual performance [1, p. 112], [12, p. 251].

It is also stressed that one of the most destructive characteristics of sex addiction is a physical dependence, similar to that occurring in the abuse of cocaine, a person affected constantly bears in itself (literally) own tray with drugs.

In the case of sex addiction we have to deal with symptoms such as: a) life orientation dominated by the sexual needs, b) lack of stable compounds, c) frequent changes of partners, d) eroticisation psyche distorts adapt to the requirements of the surrounding reality.

Sex addiction is not yet available to us included in classifications of disease. Clinical practice has developed, however, a number of useful tools for the diagnosis of sex addiction. It is worth mentioning at this point even if the test SAST (version for women and for men) developed by J. P. Schneider. It may be helpful as forty questions the community SLAA (Sex & Love Addicts Anonymous) and ten characteristics of compulsive sex by P. Carnes.

Our difficulty with this term applies to determine what it is and how to determine the "mean" sexual activity (which is the norm when it comes to sexual activity, and what exceeds it?).

We currently have no clear diagnostic clues for sex addiction. Any descriptions of this disorder based on clinical experience and observations or individual research. But they are not consistent enough to constitute a clear indication of the diagnostic. So here we have to deal with the whole spectrum of problems, from excessive use of pornography, through uncontrolled masturbation, ending with frequent casual sexual contact or for frequently changing sexual partners.

In the literature, sex addiction is called, however, more and more team sex addiction, and extracted based on the research and practice of clinical signs suggestive of its existence can be presented as follows:

- loss of control over sexual behavior;
- severe consequences of the activities undertaken erotic;
- inability to stop sexual behavior despite negative consequences connected with it;
- returns to the self-destructive behaviors and high risk situations;
- persistent efforts to limit the activities of preferred sex;
- obsession with sex and fantasy as the main strategy to cope with life;
- growing demand for sexual experience;
- profound changes as a result of dispositions of existing sexual behavior;
- wasting time on obsessive thoughts and fantasies, acquiring partners;
- neglect of professional matters, family and leisure [3, p. 18].

In addiction to sex we do not have to deal with some specific behavior in which sexual arousal occurs due to a specific stimulus. Rather, the point is that it is available to all normal sexual behavior, cease to be controlled, they are characterized by repeatability so intense that harm the interests of the patient and others. It must therefore be distinguished from sex addiction disorders such as: fetishism, fetishistic transvestism, exhibitionism, voyeurism, pedophilia, or other disorders radical practice of masturbation.

Sexual activities are undertaken also on the Internet. These activities consist mainly watching and downloading pornographic websites while masturbating, reading, or writing letters, stories of erotic content, exchange e-mail to find a sexual partner, visiting chat rooms erotic engaging online sexual relations with persons of the opposite or the same sex (including watching their bodies in real time by the webcam). Among others, related to virtual sex acts are: telephone calls with sexual content with unknown

people online, and relationships that turn into actual sexual contacts outside the network [23, p. 73]. Disease of sex addiction has manifold presentations and variable symptomatology.

Sex on the Internet is interactive, it allows the exchange of words and images in real time. Some authors claim that the excitement reached - result of practicing any type of virtual sex, becomes a form of mental escape from everyday problems [8, p. 68] and the ability to change reality it is a reinforcing agent and leads to repeat this kind of experience.

It is estimated that one in five people addicted to sex - via the web performs sexual activity, and the number of drug-addicted men against women, is 5 to 1 (in the case of women, but the trend growth) [4, p. 181]. Research shows that men use the Internet mostly for viewing pictures and pornographic films, sex and virtual (cyber sex), in their case, eliminating the fear of the failure of someone else's needs or capabilities to avoid the various problems related to sexual life. It is emphasized that especially men, who are uncertain of their attractive appearance and other "values" of their masculinity, can thus easily establish relationships with women, not being-seen and to be evaluated [25].

Factors sex addiction

Among the reasons for sex addiction plays an important role phenomenon of the increasing sexualisation of the sphere social and cultural [7, p. 43 - 64] included, among others, its expression in the sexualization of advertising, magazines and many other forms of communications (mainly media that are simply saturated with sexual content), reaching both adults and adolescents, and even children. The manifestations of this phenomenon are not only hundreds of ads (erotic relationship with advertising), film, against which the average viewer is not able to effectively defend themselves, but also openly functioning so. escort agencies, sex-cabin, massage parlors, a rapidly growing market for pornographic and erotic services, an increase in street prostitution and roadside, and the increase in the number of deviant sexual behavior, including sexual offenses.

The last two decades have also led to a huge supply of sexual content in the form of videos and erotic press (sometimes downright pornographic) sexualisation of ads (especially those related to women's underwear), shops of "gadgets" sexual. The same access to this content is almost a mass.

The impact of the increase in sex addiction is the commercialization of sex market, which results from the simple need to gain money and commercial exploitation of sexuality in order to achieve financial gain, while the broader sense is a direct or indirect "use of sexual stimuli for business or increase market [7, p. 52].

Commercialization of expression of sexuality is the emergence of both any goods associated with the sex life of man and corresponding to or designed to address real or imaginary needs, as well as more and more everyday goods that are advertised by sex (sex sells). An expression of this is moreover the same sex as a commodity and the human body or its individual parts, in case if they are offered and sold.

As a result of that, according to the authors, the commercialization of sexuality means that the sphere of sexual started to encroach on the domain of the world of goods, while interpersonal feeling erotic-sexual begins to be subordinated to the rules of the market economy, and the most visible example "the environment in which the fusion of sexuality and commercialization is almost feature constitutive for this medium is the Internet" [7, p. 52].

Some researchers also argue that sex addiction is a neurochemical response to ever increasing levels of anxiety and stress in their lives [14].

The spread of the phenomenon sexual addiction undoubtedly influenced by the Internet network, which is a specific and at the same time the dominant form of dissemination of pornographic and erotic. Internet network in many cases becomes a source of cybersex (sex virtual) [25]. (Young 2007), the most common form of Internet addiction, consisting mainly watching and downloading pornographic websites, reading and writing letters about the erotic content, exchange e-mail in order to establish contacts with sexual nature, making online sexual relations with persons of the opposite or the same sex or on phone conversations of a sexual with unknown persons [23, pp. 73-75]. Another phenomenon is the lack of moral and legal barriers restricting the supply of pornographic content on the network.

On the Internet we pay attention, indeed, he has played in the last few years a huge role and emancipatory education (often antyedukacyjną) in terms of sexual behavior, resulting in:

- clearly decreased age of first sexual education,
- decreased age of contact with the real sexual behavior (eg. By watching pornographic films).
- enlargement has knowledge of children and youth on. Contraception and sex,

- frequent regular contacts teenagers, increased the number of underage women who became pregnant.
- increased supply of information dewiacjach and non-normative sexual zachownaiach.

All of these factors have had, and will have a significant impact on the future development seksoholizmu, one of the fastest growing pathology, and also behavioral addiction.

Comprehensive analysis of the problem beyond the scope of the article, hence we are not able to take all his weighty aspects. Reference will therefore be those associated with the terminology problem etiology, symptoms, diagnosis, certain behaviors, so in theory and analysis of cited cases.

The consequences of sex addiction

Sex addiction causes a number of serious consequences manifested mainly in the following areas: a) somatic (eg. Venereal diseases, decreased immunity), b) mental (eg. Negative mental states), c) social (eg. The destruction, disintegration of the family, the loss of a spouse or regular partner, d) legal [18, p. 81].

Among the severe terms of mental consequences seksoholizmu should point to a negative self-image and loss of dignity and negative attitudes towards each other (according to the study, this situation is confirmed when 97% of people addicted to sex) [3, p. 22].

The effect of sex addiction is also a growing isolation, the gradual decline in the ability of emotional, limit the scope of personal experiences to continuously thinking about sex (erotic fantasies and obsessions that deliver pulses to sexual behavior, even those that are associated with breaking the law). It should be noted that devoting a lot of time imagining or play behaviors erotic or planning ritual sex makes the sex addict becomes less and less adapted to the realities of life and, consequently, the reality becomes for him something temporary and makeshift, and ideas replace, I am a "real" [18, p. 130].

People addicted to sex are also prone to making self-destructive behaviors (including suicide attempts) in connection with the experience of "existential dissonance", which consists of "loosing" their own subjectivity. Autoimmunity may in this case be associated with a loss of sense of life as a result of powerlessness over addiction.

Sex addiction leads to a disturbance on a plane marriage and family relations, and in many cases is reflected in the total destruction of life goals addict [13]. The result of the subordination life activity of the sexual desires of the neglect of family duties, professional matters, recreation and leisure, current interests, and other important forms of activity. Loss of ability to feel satisfaction or pleasure of experiencing unrelated sexual experiences makes the addicted person is not able to create a realistic and constructive vision of his own life (ibid).

Important consequences sexual addiction are somatic damages related to violation of the homeostatic balance of the body, impaired as a result of the body's constant state of sexual arousal. In this case, a man works like chronic stress during extreme when there are factors of intensity of near-threshold body strength. Stadium exhaustion occurs when the stimulus work too hard or too long, because the body loses defense capabilities. Indicators of this stage are dysregulation of physiological functions and high susceptibility to somatic illnesses. The results show that in 59% people addicted to sex exceed the threshold of exhaustion, and in 38% - even threshold of physical injuries [3, p. 22].

In addition, focus on the sexual sphere and compulsive sexual activity exposes sex addict negligence in meeting other needs, such as sleep, eat and rest. Over 65% people addicted to sex complain of insomnia, stomach ulcers and cardiovascular disease, which are likely to result from long-term mental tension, conflicts and failures in social life [18, p. 120-121]. It should also be noted that frequent sex with casual partners greatly increases the risk of unplanned pregnancies and abortions, and venereal diseases transmitted sexually (eg. AIDS [17], syphilis, gonorrhea, trichomoniasis, genital warts). Venereal diseases were found in the case of 38% of men and 45% of women addicted to sex, and 64% are still, in spite of illness, undertook sexual activity [3, p. 23 - 24].

Addiction to sex can become a cause of violations of legal norms, eg. When the repertoire of sexual activities in subsequent phases of addiction are included in the behavior of a deviant, especially physical violence, [20] in order to thrill erotic necessary the discharge of mental tension, as well as in the case of attempts to gain further sexual partners as a result of harassment, bullying or other such behavior.

The problem of treatment of people addicted to sex

In working with people addicted to sex, like alcoholics, works approach integrating different schools of psychotherapy. This does not mean, however, that the treatment of people addicted to sex can be done on the basis of tracing a therapeutic program for people addicted to alcohol. Effective help patients addicted to sex is usually not possible without further psychotherapy.

Effective psychotherapy for people with sex addiction, beyond the understanding of neurobiological changes taking place, it is necessary to understand the emotional and cognitive processes, which are both the result and the cause of the disorder. Mechanisms sex addiction occur with clarity and no less intensity than in the case of alcoholism.

It is indicated for systemic and cognitive-behavioral approach to sex addiction [14]. All Individuals have the capacity to be successfully treated. To recover, the person a sex addict must learn to recognize your patterns of behavior. Such a person should know your cycle inveterate and know how it can stop it.

It is therefore important teaching people addicted to sex other, less destructive ways of coping with tension and frustration. It is important to recognize emotions overlapped by hunger inveterate and consent to their survival.

In the case of sex addicts is particularly important mechanism delusions. It is stronger, the more addicted person compulsive behavior violates the norms, threatening his family, he risks losing everything important in her life.

It should also be noted that those addicted to sex attempt to scale down the risks associated with their sexual activity, using a variety of defense mechanisms, mainly the denial of the facts and / or rationalization. Using the mechanism of denial, addicted person does not perceive even the most vivid signs of his addiction, which helps him in getting rid of or blocking negative emotions (eg. Feelings of anxiety, guilt, etc.). The mechanism of rationalization, however, is a specific attempt to explain the risky sexual behavior in terms of necessity or personal gain.

In the context of this mechanism becomes understandable decisions involving exposure to infection themselves and their partners sexually transmitted diseases, risking exposing the (sometimes advisable to intensify the sensations), loss of work, traffic accidents, etc.

In this case, it is helpful in the treatment of cognitive particular approach.

Conclusions

Based on the analysis, we can conclude that the case of sex addiction we have to deal with the sexual domination over other areas of human activity. This behavior is expressed in the search for ever new and enhanced sexual experiences. Therefore, sex addiction tends to separate into a separate sphere of life, set at a maximum of erotic sensations, offset by the wayside (or even without) other important spheres of human life [22, p. 183].

It should also be noted that the growing need for erotic sensations disintegrates individual life and social addict. Therefore, a person loses the ability to rationally manage their own lives and sometimes even enter into conflict with the law. In addition, a kind of obsession with sex, persistent search for new partners and treating them as objects of utility, designed to achieve pleasure, could hinder the achievement of constructive life goals.

The bridging phenomenon of sex addiction, it is important to support the psychosexual development of man [10, 19, p. 108] and undertaking preventive measures taking into account both personality factors, as well as social, causing compulsive sexual behavior. Do not forget that mature sexuality is expressed in the sphere of gender switching man in the whole of its operation

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A meta-individual perspective in personality studies¹

Abstract: A meta-individual perspective in personality studies is shown as a kind of dual-system models. Duality and complementarity principles lead to structuralist and functionalist accounts, which yield multi-dimensionality, dual chains, and interaction.

Keywords: meta-individual world, duality, complementarity, multi-dimensionality, dual chains, interaction.

1. Introduction

Given its roots in philosophy, contemporary psychology has largely adopted an analytic approach (e.g., [2], [3], [4], [5]). During last decades, psychology researchers have also acknowledged integrative and systems theories. We propose a meta-individual world theory. It can be seen as a kind of dual-system models in personality studies.

The paper consists of several sections. In the first section, the meta-individual world is considered as a kind of integrative theory. The second section is concerned with the notion of the meta-individual world. Here we attempt to conceptualize what the meta-individual world is, how it is organized and how it regularly operates. The third section uncovers the principles of duality and complementarity as the core of the meta-individual world theory. The fourth section deals with structuralist and functionalist accounts, which are shown on the lines of multi-dimensionality, dual chains, and interaction. In conclusion, the overall results of the study are summarized.

¹ An earlier version of this paper was presented at the 2nd International conference "Science, Technology, and Art Relations – STAR" (Tel Aviv, Israel, 19–21 November 2014). A longer version of this paper has appeared in the URL: http://engineers.org.il/_Uploads/12583STAR2-Papers Abstracts.-pdf, (pp. 65–80). [1].

2. The meta-individual world theory as a type of integrative theory

The meta-individual world theory is a type of integrative theory. The last decades, psychology researchers have recognized the importance of integrative theories, among them, for instance, perspectivist theory [6], system justification theory [7], subjective well-being theory [8], and shared reality theory [9]. In Russian psychology, Volf Merlin [10] has developed a theory of integral individuality. Besides, systems theories have emerged as well. Most system perspectives have been expanded to include personality research (e.g., [11], [12]). Numerous dual-system models in cognitive, personality, and social psychology (e.g., [13]) have also received attention. In the above list, the meta-individual world theory would also be worth noting.

Although the theory of the meta-individual world was first published around two decades ago [14], it has been further developed ([15]—[19]). Its scope has expanded and its level of precision has improved. In addition, much new empirical evidence for this theory has been supplied. Thus, the theory of the meta-individual world has changed substantially to date. Taking into account its current state, it would be further developed.

3. The notion of the meta-individual world

To begin with, it is necessary to define the key term, that is, what is the notion of the meta-individual world? The term 'meta' has both epistemic and ontological meanings. On the epistemic view, the meta-individual systems approach assumes a generic model of some portion of reality supplemented with partial confluence theories. It is a kind of meta-theoretical principles, which explicitly or implicitly guide empirical research [20]. On the ontological view, the meta-individual world conceives of a personality extension in a larger system, namely, both the personality itself and its reach beyond its body, extending to a closer social setting. In everyday life, people ordinarily deal with a subjective sense of knowing rather than with more rigorous, objective knowledge. This subjective experience is a valuable rather than objectively verifiable knowledge of reality [21]. The meta-individual world is mostly based on this subjective experience. The notion of personality used here refers to the dispositional ground that focuses on the broad, enduring and stable characteristics, which remain invariant across situations (e.g., [22]). The closer social setting embraces all that is meaningful for the personality: relatives, friends, valuable ideas, preferred occupation and career, art and literature, leisure, and the like.

The meta-individual world's various implications can be seen in related phenomena, such as creativity and intelligence, memory and imagery, personal interrelations and leadership, achievement motives and growth, the performers' perspective on art pieces.

4. The principles of duality and complementarity as the core of the meta-individual world theory

Two principles lie at the core of the meta-individual world theory: duality and complementarity. According to the duality principle, two systems are specified. One of the systems (System 1) unifies the personality and its closer social setting. Within this system, the personality extends to its closer social setting, making changes in it. Thus, the personality occupies the primary position and the closer social setting the secondary position. This system carries a connection of the closer social setting to the personality. The other system (System 2) also connects the closer social setting to the personality, but in the opposite direction. Within this system, the closer social setting extends to the personality, making changes in it. Here, the closer social setting occupies the primary position and the personality the secondary position. The two systems are distinctive, operate in their own right and are relatively independent from one another, although they hold a common personality-social ground. Actually, the meta-individual world carries a twofold meaning, which is uncovered through the systems 1 and 2.

Traditionally, researchers prefer to examine the above systems separately. This allows them to avoid any collision between these systems. The rationale is that systems 1 and 2 are to some extent not quite compatible. They collide, though they co-exist and supplement each other. The issue is to identify how mutually conflicting systems can exist and co-exist and how the personality reconciles the conflicting systems. Thus, it is of particular importance whether one system can complement the other system, although the complementary principle has been developed within another framework as well [23]. Duality and complementarity are principles that bring an additional and integrative knowledge about people's lives because extra conditions are taken into account.

The following examples will show the above-mentioned systems really co-existing. Imagine a person selecting a book to read. The person then holds the primary position and the selected book the secondary position (System 1). As the reader assimilates the contents of the book, she is under its influence. Then the book takes the

primary position and the reader the secondary position (System 2). A more complex example emerges if we imagine the reader under the book's influence (System 2) and at the same time mentally changing, modifying and introducing extra meanings to the book's contents (System 1). This is even more apparent when the person is involved in the process of learning to write narratives (System 2) and then starts writing her own narratives (System 1). Within the meta-individual framework, any of the above examples requires capturing both systems and their complementarity. Certainly, the above examples are rather simplified, but they uncover the core of the meta-individual approach.

It seems that empirical testing of the dual systems should begin with a treatment designated to separate one system from the other. It is also necessary to divide the variables conditional on their membership in one or another system. Even if these two conditions are not fully met, they still provide a worthwhile starting point. We have been conducted several studies that attempt to take an account of this treatment.

In one study [24], girls aged between 18 and 20 were asked to evaluate their mothers, fathers, younger siblings and themselves on a set of variables. One prediction was that the same girls as daughters and older sisters would differ on the same variables. Actually, the girls' reports differed significantly from their evaluations of parents (System 2) and younger siblings (System 1) on the same variables. Self-conception, novelty seeking, and dominance were defined as respective significant discriminators. Significant differences were also indicated on variables of gaining control over another person, reward-dependence, harm-avoidance, persistence, adaptation, and cooperation. The data obtained evidenced that evaluations are flexible and shift across the two systems. In general, the girls' personalities revealed their dual properties conditional on the system in which the girls enter.

In another study [25], relationships between sergeants and officers, as well as between sergeants and cadets, were examined in a male sample from the Military University of the Russian Internal Troops. Again, one assumption was that the sergeants' relations to officers and cadets reveal different systems, namely, System 2 and System 1. In particular, the differences appear because the sergeants are subordinate in relation to officers and commanding in relation to cadets. One prediction was that the same sergeants in subordinate and commanding positions would differ on the same variables. The data obtained were consistent with this prediction. The variables of dominance, social conformity, lies, and self-confidence varied significantly across

the above systems. The sergeants revealed fully the dual properties of their evaluations conditional on the system in which they enter.

5. Structuralist and functionalist accounts

The dual and complementary principles can serve as a ground for structuralist and functionalist accounts. The former leads to multi-dimensionality, the latter to dual chains. In addition, the interaction between Systems 1 and 2 reveals their complementarity.

Multi-dimensionality. Notably, the personality-social ground is common for System 1 and System 2. But this ground will be seen as heterogeneous. The initial criteria for highlighting the particular personality-social ground of each system can be as follows: (A) System 1 and System 2 work in opposite directions. (B) There are differences between primary and secondary positions specified within each system. As a result, a partitioning of the personality-social ground arises. First, the personality domain and the closer social setting domain appear. Second, the personality domain divides into two subdomains and the closer social domain into two subdomains as well. Within System 1, one personality subdomain joins to one closer social subdomain such that the former occupies the primary position and the latter the secondary position. Conversely, within System 2 the other personality subdomain joins to the other closer social subdomain such that the former holds the secondary position and the latter the primary position.

Thus, the personality domain can be viewed as two-dimensional because one of its subdomains is involved in System 1 and its other subdomain in System 2. The closer social domain is also two-dimensional, due to one of its subdomains referring to System 1 and its other subdomain to System 2. Finally, the meta-individual world conceives of a four-dimensional structure including the subdomains of systems 1 and 2. Empirical data obtained [26], [27] support the claim that the aforementioned subdomains appear as separate factors, though they are related to some degree.

To clarify, these subdomains have received the following names: The first subdomain is termed authorship or agency. *Agency* is the capacity of the personality to act independently and make its own free choices. The personality treats itself as the cause of the actions it performs and the outcomes it produces. By doing this, the personality distinguishes between the outcomes of its own actions and outcomes caused by other agents (e.g., [28]). The second subdomain is termed possession or psychological ownership. *Possession* involves person–object relations with physical entities

like other people and artistic creations as well as with nonphysical entities such as ideas and words. Possession emerges when a personality attaches itself to objects and the target of ownership or a piece of that target becomes “its” (“It is mine”) (e.g., [29]). The third subdomain is termed *perspective-taking*. It entails taking the role of someone else (e.g., [30]). A person intuits another person’s viewpoint, perceptions, thoughts, knowledge, attitudes, or goals. The primary purpose of perspective-taking is to evaluate a situation, state, or object as it is seen by others (e.g., [31]). The fourth subdomain is termed *relatedness*. It refers to the propensity to relate to others and is usually organized around the personality’s being able to attain and maintain relationships (e.g., [32]). Various terms are used to identify aspects of relatedness, including being part of a social order, a self-in-relation, the unconditional, noninstrumental wish to merge with another, dependency, sense of belonging, attachment, affiliation, cooperation, and intimacy [33].

Thus, the personality domain falls into the agency and relatedness subdomains. The closer social domain falls into the possession and perspective-taking subdomains. In doing so, the agency and possession subdomains refer to System 1, and the perspective-taking and relatedness subdomains refer to System 2.

Dual chains. The structuralist viewpoint emphasizes the differences between the above subdomains. However, the systems approach entails highlighting their relationships as well. In the functionalist framework, chains within and between systems 1 and 2 would be the perspective underlying the unity of the meta-individual world.

Within System 1, the chain consists of at least three parts. Agency spills over into possession, traverses the human body (mentally, symbolically, or actually), and penetrates and intervenes in the closer social setting. Thus, some personalized footprints will appear in the closer social setting. Within System 2, the chain also consists of three parts, though different ones as compared with System 1. It is plausible that the closer social setting spills over into perspective-taking (mentally, symbolically, cognitively, or emotionally). Further, it transits to relatedness, which would be sensitive to an incoming intervention. Notably, no confusion will occur between systems 1 and 2 if each system holds a chain in its own right. The meta-individual world would include several independent chains. Besides, some other relationships among the systems 1 and 2 may also emerge. So far, we will refrain from treating these relations in terms of chains.

Interaction. If the meta-individual world consists of two independent systems, then integration appears within each of them only. The issue is whether these systems relate to each other in addition, namely, their interaction.

This particular interaction can be defined as moderation. In statistics, moderation occurs when the relationship between two variables depends on a third variable, i.e., the moderator. Dorfman and Butakova (not published) performed ANOVA on a sample of undergraduates to test interactions between a between-group factor (System 1) and a continuous variable as its covariate (System 2) on a dependent variable (System 1), and also interactions in the reverse direction between these systems. The data obtained evidenced that the agency and/or the possession variables (System 1) significantly interact with the perspective-taking variable modifying the relatedness variable (System 2). Conversely, neither the perspective-taking nor the relatedness variables (System 2) significantly interacted with the agency variable modifying the possession variable (the system 1). These findings evidence that System 1 can extend its influence to System 2 but the opposite move indicated no influences.

6. Conclusion

The meta-individual world theory is a kind of integrative theory. It permits to look at various branches of psychology incorporated. Among them are personality, individual differences, social psychology, and the like.

The principles of duality and complementarity uncover the roots of the meta-individual world theory. An attempt has been made to conceptualize what the meta-individual world is, how it is organized and how it regularly operates. The meta-individual world carries a twofold meaning, which reveals systems 1 and 2. They move in opposite directions and are composed differently. There is also interaction between them to some extent. The data obtained are consistent with this theoretical consideration.

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Problems of Performing Arts in Ukraine in the context of social and cultural transformations

Abstract: This article reveals the problems of Ukrainian theater in the context of social and cultural transformations in Ukraine. This publication analyzes the state cultural policy and its impact on the theatrical process in the country.

Keywords: socio-cultural transformation, government, culture, theater, art, Ukraine.

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Проблеми розвитку театрального мистецтва в Україні в контексті соціокультурних трансформацій

Анотація: Дана стаття розкриває проблеми українського театрального мистецтва в контексті соціокультурних трансформацій в Україні. В публікації проаналізовано державну культурну політику та її вплив на розвиток театрального процесу в країні.

Ключові слова: соціокультурна трансформація, держава, культура, театр, мистецтво, Україна.

Процеси соціокультурної трансформації в Україні великою мірою залежать від процесів культурної глобалізації, однією з найбільших небезпек якої є різного

роду уніфікація, що позбавляє людство унікальності, самотності, різноманітності, робить систему національної культури дуже вразливою до різного виду загроз.

Мета статті - проаналізувати проблеми розвитку театрального мистецтва в Україні на тлі соціокультурних трансформацій, охарактеризувати державну політику в галузі культури загалом та в театральному мистецтві зокрема.

Сучасна соціокультурна реальність в Україні – це результат тектонічних суспільно-політичних змін, що відбулися внаслідок розвалу колишнього СРСР та проголошення державної незалежності України. Відсутність чіткої стратегії цивілізаційного розвитку України, сучасної стратегії модернізації суспільства та всіх сфер його життєдіяльності призвело до системної кризи.

Сучасне українське суспільство розвивається “шляхом трансформації, що розглядається у постмодернізмі як поєднання на перший погляд непоєднуваного: консерватизму і лібералізму, соціалізму і капіталізму, модернізації та традиційності, прогресу і регресу [1, с. 31]. Власне, “враховуючи тотальність всіх сторін суспільного життя та самі закономірності цих змін, наше суспільство можна назвати “трансформаційним”. Трансформація передбачає співіснування одночасно процесів модернізації, постмодернізації та традиціоналістського відступу. Ці обставини дозволяють охарактеризувати трансформаційне суспільство як суспільство-мутант. Започаткував цей тип суспільства у буквальному та переносному розумінні Чорнобиль” [2, с. 31]. Притаманна Україні навздогінна модель модернізації “загрожує втратою традиційної культури, національної ідентичності й безперспективністю утвердження нової, сучасної” [3, с. 29]. Соціально-економічна криза негативно вплинула на розвиток галузі культури, зокрема, театрального мистецтва.

У пошуках власного шляху розвитку Україна, на думку В. Горбатенка, “вступила у сучасно-модернізаційний транзитно-кризовий етап своєї модернізації, який поступово виріс у самодостатній широкомасштабний процес з яскраво вираженим етнонаціональним забарвленням” [4, с. 211]. “Постмодернізація пов’язується з формуванням “інформаційного”, “технотронного” суспільства. – стверджує С. Катаєв. – Проте існуючі концепції припускають органічний рух західної цивілізації до нових рубежів розвитку суспільства, тоді як у нашій країні постмодернізація, як і модернізація, проходить по-варварськи і насильно, через страждання людей, шляхом нехтування правами людини на гідне існування” [5, с. 16].

Власне “енергія розвитку суспільства багато в чому обумовлена саме соціокультурною трансформацією” [6, с. 12].

Отже, “соціокультурні трансформації, що відбуваються в Україні, можна визначити як процеси постійних якісних змін різних соціокультурних систем суспільства, які детерміновані як об’єктивними, так і суб’єктивними чинниками, і можуть тривати від кількох років (швидкі, революційні, зміни) до кількох сотень років (повільні еволюційні зміни). Ці процеси відбуваються поетапно, мають власну логіку і ресурси. Головним вектором соціокультурних трансформацій, що відбуваються на теренах України, є пострадянський (посткомуністичний, посттоталітарний, постколоніальний) вектор” [7].

В Україні відсутня цілісна концепція розвитку національної культури. Безперечно, що “майбутня концепція культури – це не план, не тільки програма практичної діяльності, не сукупність законодавчих актів, – вважає І. Дзюба, – а система осмислення історії, нинішнього стану і перспектив нашої культури” [8, с. 634]. Що стосується засобів культурної політики, то насамперед слід позбутися адміністративно-командного керування культурою, віддавши перевагу інноваційним підходам, переходити “до цільового програмування, визначення пріоритетів, створення законодавчої і нормативної бази, спираючись на яку, заклади культури могли б самоврядно виконувати свої функції. Треба передбачити поєднання центрального координування із розвитком регіональних структур” [9, с. 634–635].

Виходячи з культурологічних позицій “державну культурну політику ми визначаємо як політику держави у сфері культури, що здійснюється державою – провідним суб’єктом культурної політики за рахунок суспільних ресурсів, спрямовану на активізацію взаємодії субкультур шляхом формування загальнонаціональної картини світу – ядра культури суспільства та на реалізацію культурних потреб різних суб’єктів культурного життя з урахуванням стратегічних національно-культурних інтересів” [10, с. 97]. Саме державна культурна політика, що є основним регулятором театральної сфери, “виявилась неадекватною новому становищу театрів, надавши їм велику творчу та інституційну свободу без необхідної матеріальної підтримки, що й породило низку “хвороб” зростання і випробувань на виживання із певною втратою значною частиною театрів творчих позицій” [11, с. 233].

Після проголошення держаної незалежності України не було чіткого розуміння особливостей управління сферою культури, і, зокрема, театральною справою, в нових ринкових умовах. На відміну від радянської влади, сучасна влада в Україні не зрозуміла важливість театального мистецтва у процесі державотворення. Більше того, вона “відкинула театр як непотріб на маргінес суспільно-політичного розвитку, віддавши інформаційний простір для цілеспрямованого зомбування “малого українця” і перетворення його на такого собі біоробота, слухняну машину для голосування під час виборчих кампаній” [12].

Органи державної влади в ухваленій “Концепції державної політики в галузі культури на 2005–2007 роки” офіційно визнали, що “сучасний стан розвитку української культури і духовності характеризується розмиванням і поступовою маргіналізацією культурних і духовних цінностей у суспільному житті, руйнуванням цілісної мережі закладів, підприємств, організацій та установ культури і цілісного інформаційно-культурного простору, неефективним використанням наявних культурних і творчих ресурсів” [13]. Прикро, але за десять років так нічого і не змінилось.

Управління театральною справою на нинішньому етапі соціокультурної трансформації на думку деяких вчених можна сформулювати “як єдність процесів соціально-художнього прогнозування, планування, регулювання і виховання. При такому підході формування планових показників має ґрунтуватись на прогнозних розробках [...] Адже ми маємо справу здебільшого з державними театрами, яких понад 130 в Україні і які наполовину фінансуються державою [14, с. 227]. Що стосується регіонального органу управління культурним життям, то його основною функцією “є погодження інтересів творців художніх цінностей з інтересами публіки, громадськості, досягнення відповідності театральної творчості, вистав художнім потребам глядачів” [15, с. 232].

Подією в культурно-мистецькому житті стало ухвалення ВР України у лютому 1992 р. “Основ законодавства України про культуру”, які визначили правові, економічні, соціальні, організаційні засади розвитку культури в Україні. Згідно із Законом втручання у творчий процес, цензура у сфері творчої діяльності не допускаються. Держава гарантувала необхідні асигнування на розвиток культури в розмірі не менше восьми відсотків від національного доходу України. Однак фінансування сфери культури в таких обсягах так і залишилось лише декларацією добрих намірів.

У травні 2006 р. вступає в дію довгоочікуваний Закон України “Про театри і театральну справу”, який регулює суспільні відносини в галузі театральної справи, що виникають у зв'язку зі створенням, публічним виконанням та публічним показом театральних постановок, визначає правовий статус театрів, форми їх державної підтримки, порядок їх створення і діяльності та спрямований на формування і задоволення творчих потреб та інтересів громадян, їх естетичне виховання, збереження, розвиток та збагачення духовного потенціалу Українського народу. Закон унеможлиблює існування органів цензури, як це було за радянських часів. Саме тому творчість у сфері театрального мистецтва проголошується вільною.

Після більш ніж 10-річної праці над законопроектом ВР України наприкінці 2010 р. ухвалила Закон України “Про культуру”, підписаний Президентом України 6.01.2011 р. Згаданий закон прийнято на зміну Основ законодавства про культуру, норми яких вже не відповідали новій соціокультурній реальності. Серед основних засад державної політики у сфері культури – “визнання культури одним з основних факторів самобутності Українського народу; сприяння створенню єдиного культурного простору України, збереженню цілісності культури” [17].

На думку експертів, головними причинами низької дієвості багатьох законів у сфері культури є “декларативність і неконкретність деяких законодавчих положень, не підкріпленість їх нормами прямої дії, а часто – браком дієвих механізмів відповідальності за порушення законодавства” [18].

Не увінчалась поки що успіхом спроба кодифікації законодавства у сфері культури, що дало б можливість систематизувати нормативно-правові акти, усунути прогалини, розбіжності й суперечності між ними, а також нормами, що в них уміщені, а отже надати законодавству досконалості, системності, узгодженості.

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Usage of contemporary educational theories while forming intercultural competence in foreign audience

Abstract: In the article are investigated: contemporary educational studies by Hofstede G. about a unique program of psychological personal characteristics and theory of intellectual aspects plurality, which give recommendations on sociocultural differences of foreign students.

Keywords: communication, intercultural competence, basic characteristics, theory of intellectual aspects plurality, pronouncing defections.

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Использование современных образовательных теорий при формировании межкультурной компетенции в иноязычной аудитории

Аннотация: В данной статье исследуются современные образовательные учения Г. Хофстеда об уникальной программе психологических характеристик личности и теория множественности проявлений интеллекта Г. Гарднера, которые дают рекомендации по изучению социокультурных различий иностранных студентов; это сопоставление культур представителей разных стран дает возможность избежать речевых ошибок и способствует развитию интеллектуальных и коммуникативных возможностей обучающихся.

Ключевые слова: коммуникация, межкультурная компетенция, базовые характеристики, теория множественности интеллекта, произносительные отклонения.

Переориентация в современной образовательной стратегии с приоритетности только системы знаний, умений и навыков на приобретение основополагающих ключевых компетенций в интеллектуальной и коммуникационной сферах востребовала новые методы и приемы в обучении.

Разработка и внедрение инновационных технологий, моделирование коммуникативных ситуаций, направленных на повышение конкурентоспособности будущих специалистов на рынке труда, предполагают, прежде всего, формирование профессиональной компетенции обучающихся иностранцев и их адаптацию к новой социально-культурной среде.

При решении этих образовательных задач наблюдается межкультурное скрещивание, пересечение двух и более культур представителей разных национальностей.

Этим проблемам межкультурной коммуникации посвящены научные труды, как в отечественной науке, так и в зарубежной.

Одними из основополагающих исследований в этой области нам представляются публикации ученых-соотечественников: Е. Верещагина, В. Костомарова, А. Бердичевского, Е. Пасова, О. Митрофановой и других.

В предлагаемой работе используются научные теории Г. Хофстеда о психологических характеристиках личности (Hofstede G. "The Software of Mind") и о множественности проявлений интеллекта Гарднера («Множинні інтелекти Гарднера. Теорія у практиці») [3:16].

Проводя сравнительный анализ культур, сопоставляем их на основе базовых характеристик по теории Хофстеда, где мировосприятие и миропонимание людей различных социально-культурных групп классифицируются по четырем характеристикам:

1. Властная дистанция - высокая степень неравенства между людьми. Например, в Японии, в Китае, в странах с высокой властной дистанцией, вся власть сконцентрирована в руках небольшого количества людей, остальные же члены общества следуют решениям, принимаемым этой небольшой группой.

2. Низкая концентрация власти (Дания, Австрия), где значительно большее число людей участвует в принятии решений.

3. Уклонение от неопределенности - степень, с которой люди предпочитают формальные правила и устойчивые схемы жизни. Уклонение от неопределенности тесно связано со способностью идти на риск, не избегать открытого разрешения конфликтов и конкуренции. Представители культур с высокой степенью неопределенности (США, Канада) более склонны к принятию риска!

4. Индивидуализм – степень, с которой человеческое общество предпочитает действовать индивидуально, нежели в группе. В индивидуалистических обществах люди концентрируются на себе и не склонны попадать в зависимость от окружающих. Они ставят личные цели выше целей группы. В коллективистских обществах (Китай, Япония, Бразилия, Колумбия, Чили) люди воспринимают себя как часть группы и склонны к коллективному принятию решений.

Цель данной статьи: внедрение указанных научных теорий в практику развития интеллектуальных и коммуникативных возможностей студентов-иностранцев, сопоставление различных национальных культур на основе их базовых характеристик.

Например, оценивая особенности китайского мировоззрения и мировосприятия с точки зрения Хофстеда [3], можно отметить полярное положение китайской системы ценностей по отношению к таковой у большинства неазиатских стран.

В работе с китайскими студентами эти тенденции проявляются в невозможности инициировать дух соревновательности. Хотя множество методик обучения предполагает использование естественной конкуренции между студентами для повышения мотивации и улучшения общих результатов.

С китайцами такие приемы не срабатывают, так как все межличностные проблемы и соперничество в группе вторичны по отношению к необходимости объединения, сплоченности в условиях чуждой культурной действительности. Здесь налицо проявление общественного уклада Китая с высокой дистанцией власти. Взаимоотношения в таком обществе основываются на сознании того, что человек существует только как часть семьи или клана, что требует от индивида уважения к общественной иерархии. Необходимость проявления почтительности к старшим ориентирует индивидов на подчинение власти и подавление агрессии.

Так, китайцы почтительны к вышестоящим, что выражается в демонстрируемом уважении к преподавателю, готовности подчиняться его требованиям. В данной ситуации обязательным является четкая очерченность и регламентированность требований преподавателя. В группах, где учатся китайские студенты, почти не бывает проблем с дисциплиной: они не перечат преподавателю, соглашаются на все предложения администрации; даже не поняв учебный материал, они стараются не задавать лишних вопросов, чтобы не создать для других возможной ситуации «потери лица».

Если точно не определены поставленные задачи обучения и сроки их выполнения, то китайские студенты, скорее всего, вообще не сочтут необходимым стремиться к их достижению. А чрезмерная демократичность преподавателя в любых проявлениях может быть воспринята ими как слабость и приведет к потере контроля над учебным процессом.

При обучении китайских студентов языкам необходимо учитывать то, что в Китае сформировалась уникальная идеографическая письменность, которая создала особую интеллектуальную модель любого представителя этой нации. Иероглиф как символ предмета, понятия, качества или движения – это способ образного восприятия мира. Китаец, обучаясь грамоте, учится мыслить образно, развивает свое визуально-пространственное восприятие.

Но анализируя графические ошибки китайских студентов, обучающихся на подготовительном отделении, можно отметить, что несмотря на различия графики родных языков, студенты при написании на русском языке допускают сходные ошибки. Среди них наиболее распространены следующие: использование на письме печатных букв; написание начала предложения с маленькой буквы; разная высота букв в слове; отсутствие соединения между ними; обратное написание букв б, ы; замена русских букв латинскими (б на b, м на t, й на p, п на r, р на g); написание буквы ш как латинской w; пропуск в словах гласных, реже согласных; перестановка букв в слове; перенесение разделительных знаков на следующий ряд и т.п.

Бесспорно, эти ошибки связаны с традициями китайского письма, где в одном случае используются иероглифы, а в другом вообще нет больших букв, сами буквы не различаются по высоте.

Дополнительную сложность при общении, мешающую взаимопониманию, представляют многочисленные звуковые и ритмико-интонационные ошибки в речи иностранных студентов.

Например, сопоставление фонетических единиц китайского и русского языков позволяет выявить совпадения и расхождения в образовании звуков. Именно расхождения являются причиной акцента иностранцев при говорении по-русски.

Зачастую в области консонантизма система ошибок проявляется в реализации категорий глухости-звонкости, твердости-мягкости, а также со способом образования таких групп согласных, как шипящие, свистящие, аффрикаты, носовые, смешанные, по которым носители русского языка узнают речь иностранца.

Китайцам тяжело дается изучение языков фонемного строя, поскольку каждая слогафонема (силлабема) китайского языка, будучи наименьшей групповой единицей, является также и смысловой единицей, имеющей образную идеографическую форму. Следовательно, набор фонем русского языка (слово, словосочетание или предложение) расчленяется китайцем на силлабемы, в результате чего формирование визуальной ассоциации (слово – образ) становится практически невозможным, что усложняет процесс запоминания. При постановке правильного произношения звуков русского языка в китайской аудитории надо учитывать, что китайский язык тоновый и поэтому эффективным в обучении может быть аудиальное восприятие. Это прежде всего аудиозаписи труднопроизносимых для иностранцев сочетаний фонем. Можно положить на музыку труднопроизносимые сочетания фонем и использовать эти аудиозаписи как на занятиях, так и для самостоятельной работы.

Исследование имеющихся произносительных отклонений от норм речи и пути преодоления иноязычного акцента показывают, что формирование слухопроизносительных и грамматических навыков должно проводиться поэтапно с учетом родного языка обучаемых по специально разработанной системе тренировочных упражнений разных типов и видов. Знания же фонологических и артикуляционных причин отклонений от норм в речи, обусловленные несовпадением звукового строя русского и родного языка, дают преподавателю возможность корректировать индивидуальную работу над фонетическими ошибками.

Если говорить о логико-математическом интеллекте иностранцев, то именно в этой области и возникает наибольшее число взаимонепониманий и недоразумений. Проблема состоит в зеркальном отличии логики и способа мышления, например, китайцев: они мыслят индуктивно (от частного к общему, от фактов к гипотезе), тогда как западные цивилизации базируются на дедуктивном мышлении (от общего к частному).

Китайцам чрезвычайно трудно понять и воспринять грамматическую структуру русского языка. Очевидно, необходимо создание восприятия причинно-следственных связей, роль которых в китайском образе мышления играют аналогии.

Таким образом, внедрение современных образовательных теорий способствует развитию межкультурной компетенции студентов-иностранцев, повышает их конкурентоспособность на мировом рынке труда в условиях расширенных международных контактов.

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The concept and structure of subjective civil right

Abstract: In the article considers the concept of subjective civil right: it is defined as the type and measure of possible (permissible) behaviour. The studies of its structure have established that all legal relations on the grounds of creation and functional purpose are to be divided into regulatory and protective. These both types of civil-law relations include subjective civil rights which in their turn contain two competences: 1) the ability to behaviour of an authorized person; 2) the ability to require particular behaviour from a liable subject.

Keywords: subjective civil law, a measure of possible behaviour, competence, protective legal relations, regulatory legal relation, structure of subjective civil law.

It is well known that the rights, which constitute the content of civil legal relations, are traditionally known as *subjective civil rights*, in other words — rights of certain subjects, participants of these legal relations. Abstract rights are also sometimes determined along with these rights which, unlike subjective, are "comprising moments of the realized norm, disposal and show only abstract legal possibilities of abstract legal subjects" [1].

Despite the fact that civil rights are a branch kind of subjective rights, the literature rightly shows that the problem of subjective rights has been developed mainly in special works of civil and labour law, containing general theoretical issues as well [2].

The legal literature contains many definitions of subjective right. However, "no matter how we consider and determine the subjective right — writes M.I. Matuzov — one thing remains undeniable and indisputable: it always means a certain legal possibility, permissibility, competence for a person..." [3]. The opportunity, in its various forms and manifestations, is the basis of any subjective right and serves as its initial, key priority. The moment of opportunity is such a characteristic of the subjective right, without which this phenomenon cannot exist [4].

Recently, even greater theoretical development of the issue of the subjective right is associated with the task of finding a positive content in it. Previously the subjective right has generally been reduced to the right for claim, and content thereof has been identified with the content of legal obligation, and now legal scholars unanimously consider the subjective right as the right of the authorized person for an action [5]. In other words the concept of subjective right is open not due to responsibilities of the obliged person, but due to an ability of an authorized person, which is an extended conception of the subjective right as including both an opportunity of own behaviour in the narrow sense (for example, the ability to dispose of his own right through its transfer to a third party), and the possibility of demanding the appropriate behaviour from the obliged party.

Unconditional merit in developing of positive content of subjective right belongs to S.N. Bratus, who has been the first to identify the subjective right as possible or permissible behaviour of an authorized person in literature [6]. Later, this definition has been improved and developed with indication that the subjective right, except for the measure, is also characterized by the type of possible behaviour [7]. The modern civil right gives a generally accepted definition of subjective civil right as "*a type and measure of permissible (possible) behaviour*" [8]. The type determines what exactly is allowed, in other words — acceptable behaviour, its qualitative characteristic; and measure indicates the borders of possible behaviour of an authorized person, as legally prescribed.

Thus, subjective civil right — is not the behaviour itself, but its type and measure. This possible behaviour has not actual but legal nature.

Regardless the fact that the opportunity to demand proper (desired) behaviour of (an) other person (s) is put in subjective right, the latter is the constant companion of subjective right. As its reflection, antipode, it is also characterized by the appropriate type and measure and is a legal obligation. So, the subjective right and legal obligation cannot be separated because the subjective right — is not just an opportunity, but opportunity which is provided with an obligation of (an) other person (s). In this regard, the undisputed fact is that the right of one person must comply with the obligation of (an) other person (s). Only in this case we can say about the existence of the legal connection between the relevant subjects.

The structure of subjective civil right in the legal doctrine is being actively discussed for a long time. The main controversial point remains the issue of the nature

and location of the right for protection in the structure of subjective civil right. Science representatives of theory of state and law traditionally separate three competences as parts of a structure: a) the right for own active actions; b) the legal claim; c) the right for protection. Meanwhile, the opinion according to which the right for protection is a certain subjective right is even more spreading in the literature (usually civilian).

Supporters of the conception of the three-element composition of subjective civil law partly interpret competence for protection (or, as it is called, pretension) as an opportunity to put in operation the machinery of state coercion against the obliged person, an opportunity to turn to the means of state coercion [9]. It is obvious, that the competence for protection is connected here with the state, not with an obliged offending person.

Speaking against the adjusted position of the three-element composition of subjective right, we join the opinion of scientists, taking up the position that the possibility of application of state coercion is not the competence but property of subjective right. On this subject O.S. Ioffe says: "Subjective right would not be right if its implementation is not ensured by the measures of state coercion. So, the possibility to use the coercive power of the state machinery, as necessary, exists not simultaneously with other possibilities embodied in subjective rights, but is peculiar to themselves, as without it they would not be legal possibilities" [10]. Meanwhile, in our opinion, pointed property is characteristic not for all civil rights, which will be reasonably further.

The position of scientists who consider the right for protection as a separate substantive right, addressed to the offender and emerging under the protective civil-law relations is deemed the most convincing (but with some refinements) [11]. To explain this concept, considering that implementation of subjective civil rights occurs within legal relations, we shall refer to the theory of the latter — namely, their separation into kinds.

Legal literature divides all social relations to regulatory and protective by criterion of functional use of legal norms regulated [12]. Such classification, according to V.A. Belov, in the future, will be crucial in civil law, even in comparison with division of the legal relations to absolute and relative [13]. However, it seems that the adjusted criterion is not exactly successful in terms of clarity of differentiation of these types of legal relationships. This is explained with a kind of conditionally nature of division of objective rights to regulatory and protective. They cannot be completely divided, in the

real world they are intertwined: law enforcement is an element of the legal regulation, and legal regulation is the means for law enforcement ensuring.

Considering the information above, it seems that it is more appropriate to talk about legal fact as criteria for separation of legal relations to regulatory and protective. Under such conditions, the grounds for regulatory civil law relations should be considered as rightful legal actions (contracts, creation of results of intellectual activities, acts of public authorities, etc.). In turn, the grounds for protective legal relations will be violation, non-recognition or contestation of subjective civil rights, violation of legally protected interests.

At that, we should immediately make reservations concerning terminology, in particular "protective legal relation". General theoretical literature, as has been already stated, concerns the protective function and protective legal relations, existing at regulatory level. Meanwhile, the modern civil law, despite there is no common point of view, still shows clear trend to separation between security and protection. In particular, it is pointed that security should be discussed as the legal measure that prevents violation, and about protection – as a further stage of violation and entailing reconstruction of relevant subjective right. It offers certain opportunities, which are given to the bearer of this right in addition, in comparison with such as the latter had before the offense [14]. Thus, it is determined that in grounds for legal protection is the principle of inviolability and effectuation of civil rights, while the security is aimed to reconstruction of certain violated subjective rights and removal of obstacles at its implementation.

A thesis that security is a category that belongs to the phenomenon of objective rights, which regulates the opportunities granted to subjects, as participants of certain legal relations also seem convincing [15]. It results in the conclusion, that using the term "security legal relations" cannot be used at violation of subjective civil rights / interest. Under these circumstances, in our opinion, we should speak about the creation of a protective legal relationship. Incidentally, the terminology of protective legal relations has been operated by pre-revolutionary civilian S.A. Muromtsev, who is rightfully considered to be the progenitor of the theory of functional separation of law [16].

Thus, the protective legal relations, so to say, are created in a conflict situation. As rightly noticed by I.A. Dzera, under these circumstances the victim obtains a right to use a certain protection method [17]. Zhylinkova I.V. agrees with her: "At implementation of the right for protection, the victim party usually has to use means of compensatory nature, which are meant to restore its "original state" (compensation for losses

or moral damages, regain of position that has existed before the violation, etc.)" [18]. These rights are the protective legal relations, addressed to a certain offender, and thus always have a relative nature. For example, due to violations of property, rights right to vindication may be accrued, while due to violation of the treaty subjective rights — the right to enforcement of obligation in kind, the right to demand payment of a penalty and so on will emerge.

The regulatory legal relations, in their turn, are composed of subjective rights, which are aimed at normal development of legal relations. Examples of such rights would be property right, right of use under a lease contract.

Speaking about the content of the regulatory and protective legal relations, it use of relevant terminology: "regulatory" and "protective" subjective civil rights firstly appears possible. Incidentally, scientists who recognize the existence of regulatory and protective (in our terminology — protective) legal relations use the concept of regulatory and protective subjective right. However, in our opinion, the subjective civil rights by themselves, as the degree of freedom, do neither regulate nor protect. They have different grounds of accrual and thus exist under protective or regulatory legal relations by functional use.

The abovementioned allows for the conclusion that certain authority — the authority of the defence in structure of subjective civil rights does not exist. We should only talk about the rights, which develop within different legal relations by functional use. Thus, *both the rights, which compose the regulatory relations and the rights, which are included in protective legal relations, include two function groups: 1) the possibility of the particular behaviour of an authorized person; 2) the possibility to require the particular behaviour from an obliged subject. These authorities compose the structure of subjective civil rights.*

Depending on which, by definition, the subjective civil right is — absolute or relative, one of these authorities comes to the first place. Thus, the absolute rights are based on the authority for their own actions and authority of demand is aimed only to keeping of public from intrusion into the sphere of absolute rights. In their turn, the relative rights, vice versa, firstly show the authority of demand of appropriate behaviour from an obliged person. This component is the priority value of such rights. At this, the authority for own actions within the relative rights is a legal possibility to make a request to the obliged person, accept the accomplished under obligation, dispose of their right and so on.

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Artistic features painting and artistic decoration of silk in the Far East

Abstract: In researching reviews the main technology and artistic decoration painting silk fabrics in the Far East. Considered as the origin and popular ways to get natural dyes and chemical origin.

Keywords: silk, dyes vybiyka, stencil, countries of the Far East.

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Художні особливості фарбування та художнього оздоблення шовку в країнах Далекого Сходу

Анотація: У дослідженні розглядаються основні технології фарбування та художнього оздоблення шовкових тканин в країнах Далекого Сходу. Розглянуто також походження та способи отримання популярних барвників природного та хімічного походження.

Ключові слова: шовк, барвники, вибійка, трафарет, країни Далекого Сходу.

Мистецтво оздоблення шовкових тканин відоме з найдавніших часів. Кожна епоха, кожний народ вносили щось нове в це мистецтво. Але історія виготовлення та оздоблення шовку починається саме з Далекого Сходу.

Шовку Китаю, Японії, Південно-Східної Азії і, частково, процесам виробництва та фарбування шовкової нитки, присвячені глави книги Г. Бернхама «Китайський шовк» (Торонто, 1959), Шовковому шляху – розділи дослідження І. Франка та Д. Бронстон «Шовковий шлях» (Оксфорд, 1986) [5]. Серед праць вітчизняних

авторів можна виділити роботу Є. Лубо-Лесніченко «Китай на Шовковому шляху (Шовк і зовнішні зв'язки стародавнього і ранньосередньовічного Китаю)», де в письмових джерелах періоду Чжаньго й Хань описані згадки про специфіку фарбування шовку [3].

Мета даної статті – розкрити специфіку фарбування та художнього оздоблення шовку в країнах Далекого Сходу.

Ще не володіючи технікою фарбування тканини, стародавні китайці вміли отримувати шовк різних натуральних кольорів. Вони помітили, що колір коконів шовкопряда залежить від того, чим харчується гусінь. Так, «домашній шовкопряд» давав шовк білого кольору, якщо його гусінь в період зростання годували тільки листям білої (садової) шовковиці. Для отримання жовтого кольору шовку гусінь першу половину життя годували листям дерев Чже (дикий тутовник, який зростає в горах), а в другу – листям садової шовковиці.

У коментарях Мао Янцзіна до «Чжоуських обрядів» підкреслюється, що приготування шовку до фарбування можна розділити на чотири стадії: а) промивка, б) виварка, в) відбілювання, г) травлення. Після розмотування коконів і зрощування ниток починалася промивка. Вода для промивання шовку в нитках очищала за допомогою золи. Шовк при цьому очищався і ставав білим, так як втрачав залишки серицину й бруду. Через сім днів нитки шовку розкладали на землі на глибині одного чи (близько 20 см) для просушування. Якщо майстри не дотримувалися цієї глибини, то була небезпека, що гаряче повітря пересушить нитки. Від цього вони тьмяніли. Вдень нитки сушилися на сонці, вночі їх клали у колодязь. Так тривало сім днів і сім ночей [3, с. 110]. Після промивки нитки можна було використовувати для ткання одноколірних матерій (тафта, репс, камка, газ, креп). Якщо ж нитки призначалися для виготовлення поліхромних тканин, їх піддавали подальшій обробці: виваренню, відбілюванню й, залежно від барвника, травленню. Ці ж операції проходили й готові одноколірні тканини перед фарбуванням.

Найстаріша техніка друкування – нанесення візерунку на тканину пензлем або аналогічним інструментом, була дуже поширена в Індії, Китаї, Єгипті. В Індії, поряд з великою кількістю природних органічних барвників, існувала висока орнаментальна культура, високе мистецтво різьблення по дереву, що не могло не відобразитися в оформленні предметів одягу. Одним з найдревніших способів отримання орнаменту вважається фарбування за допомогою вузликів-бандхарі, які зав'язувалися на тканині перед її зануренням у фарбу [6, с. 91].

За часів династії Хань в Китаї для додаткового художнього оформлення текстилю стали використовувати вибірку (орнамент, який одержували шляхом занурення тканини у фарбувальну рідину). Найдавніший рельєф для друку на текстилі в Китаї був знайдений у гробниці династії Хань в Хунань. Техніки вибірки прийшли в Китай від тайських народностей, що мешкали в той час на території сучасної провінції Юньнань, які практикували нанесення барвистих візерунків на бавовняні тканини. Найбільш ранньою для Китаю є воскова вибірка (чжасі – «візерунки воском»), яка здійснюється двома способами. Рідкий віск накладається на тканину за малюнком, а коли він охолоне, тканина занурюється у фарбувальний чан. Після забарвлення віск видаляється, й на поверхні тканини залишається незабарвлений орнамент. Всі ці процедури можуть йти і в зворотній послідовності: віск накладається на вже забарвлену тканину й занурюється в лужний розчин, який змиває її забарвлення, за винятком місць, покритих воском – принцип резерважу. Обидва способи дозволяли створювати двоколірні й триколірні орнаменти, наприклад, жовтого, синього й оранжевого кольорів, і виконувати їх з обох боків тканини. На Яві та Суматрі такий спосіб використовують і зараз в оздобленні бавовняних та шовкових тканин для національного одягу сарі та саронгу.

Перші штампи для нанесення зображень на тканини, які відносяться до періоду 6500 р. до н.е., були знайдені під час археологічних розкопок у Малій Азії. Китайці ж використовували трафарети з щільного паперу з вирізаним зображенням у зворотному напрямку, яке мало з'явитися на тканині. Такий трафарет накладався на білу тканину, потім на нього щіткою наносилась паста з сої, вапна або кальцинованої соди й тунгове масло. Суміш рівномірно розподілялась на трафареті так, щоб вона просочувала тканину в місцях, де на трафареті вирізані візерунки. Після того, як паста висихала, тканину поміщали в чан з синім барвником індиго. Далі майстри згрібали пасту з сухої тканини, залишаючи непрофарбовані області, які контрастували з візерунками індиго. Цій техніці більше 1300 років.

Блокова вибірка (цзясе – «стислі візерунки»), запозичена у сусідніх з Китаєм південно-західних народностей, складалася з нанесення орнаменту за допомогою матриць – різьблених дерев'яних дощок. Найбільшою витонченістю даний метод досяг за часів династії Тан, коли були винайдені матриці, що склалися з дерев'яної рами і розміщених у ній паперових штампів, наклеєних на тонкий шовковий газ. Перед фарбуванням тканину складали у вертикальному положенні й затискали між двома матрицями, заповненими фарбою. У результаті за

допомогою блокової вибійки могли виконуватися дуже складні за змістом композиції і поліхромні, до 7 кольорів, орнаменти [2, с. 740].

У Китайському національному музеї шовку в м. Ханчжоу зберігається відео запис 60-х років ХХ ст., на якому зафіксований процес фарбування шовку майстрами з міста Сучжоу. Це місто було одним з основних центрів виробництва шовкової тканини та її оздоблення. На відео представлено два способи фарбування: за допомогою трафарету з проклеюванням та блокова вибійка на тканині. Візитівкою південного регіону Китаю було використання саме синьої фарби індиго, тканина з синьо-білими візерунками, відома як блакитний ситець, сьогодні вважається традиційною [4]. Текстильне фарбування в Китаї можна розподілити на три типи: кручення тканини із золою, фарбування вузлами і фарбування крученням із затисненням. Ці методи були відпрацьовані ще за часів династії Цинь (221–207 до н.е.), і розвивалася протягом наступних десяти століть, занепадати почали в часи династії Тан. Техніка фарбування крученням із затисненням вперше з'явилася у сьомому столітті й була використана для виготовлення різнокольорових виробів з шовку. На жаль, сьогодні вона практично втрачена. У 1980-ті роки в провінції Чжецзян була здійснена спроба її відродити, оскільки вона є елементом національної нематеріальної культурної спадщини. Відновлення стародавнього методу фарбування шляхом кручення з затисненням, а також інструментів, необхідних для цієї методики, є одним із завдань проекту «Compass Project» Державного управління культурною спадщиною Китаю, що реалізується Китайським національним музеєм шовку. Метод фарбування крученням тканини із золою практикується в провінції Шаньдун, Хунань, Цзянсу і Чжецзян починаючи з часів династій Мін і Цин і до наших днів. Фарбування вузлами здійснюється шляхом складання тканини певним чином і зв'язування її у певних місцях. Потім тканину поміщують у барвник. Вузли запобігають прокрашуванню всього матеріалу, таким чином створюються візерунки на тканині. Техніка з'явився у Східній династії Цзінь (317–420 до н.е.), і досягла вершини свого розвитку за династій Тан і Сун. Фарбування вузлами лишається популярною декоруванням текстилю й нині [4].

Високою досконалістю вирізнялася техніка вибійки в японських тканинах. Способи виготовлення шовкових вибивних тканин багато в чому збереглися без зміни в Японії й до наших днів. У літописах VII ст. н.е., згадується про особливий спосіб фарбування тканини – «юхата». Тканину по малюнку туго прошивали нит-

ками, а потім занурювали у фарбу. Через товщу стягнутої тканини фарба проникла не скрізь, внаслідок чого виходив своєрідний малюнок з непрофарбованих ділянок. До того ж часу можна віднести інший цікавий спосіб нанесення малюнка на тканину – «рокетти». Він наносився гарячим воском, потім тканину занурювали у фарбу, висушували, а віск видаляли. Ця техніка була запозичена в Індії. Ще існував спосіб нанесення малюнка на тканину дерев'яними формами. Часто дві техніки єднали, і створювали такі твори мистецтва, як ширми «біобу». Крім того, в Японії також використовували вибивання малюнка за допомогою трафарету та дощечок. До більш пізнього періоду відносять художній розпис шовкових тканин від руки, що вимагає від художника великої майстерності й смаку. З кінця XVII ст. тут на шовкові тканини стали наносити складносюжетні композиції, пейзажі [6, с. 93].

Китайський шовк відомий своєю пишністю кольорів. У період династій Шан і Чжоу (XVII–III ст. до н.е.), китайці в своєму прагненні до краси створили власну систему барвників за рахунок використання мінеральних пігментів і рослинних барвників, що зустрічаються в природі. Ці методи фарбування складають значний внесок в естетичну досконалість мистецтва шовкового текстилю [4].

Китайська туш є одним з основних продуктів, отриманих із чорних мінералів. Чорні барвники також отримували шляхом збору диму горілого дерева і соку сосни, змішуючи його з смолою або іншими клеями і хімічними речовинами, що підсилювали блиск. Щоб отримати чорний колір, китайські майстри також використовували чорні рослинні барвники, що містять галотанін. Таніни найчастіше отримували з кори дерева ліщини і монгольського дуба, а також коріння яма діоскора.

Більшість зелених пігментів стародавніх шовкових тканин містять іони міді, були виявлені пігменти азуриту, малахітового зеленого тощо. Миш'як сульфід у вигляді аури пігменту вперше був використаний як текстильний пігмент в Західній династії Чжоу. За допомогою цієї речовини утворювався теплий, інтенсивний червонувато-жовтий колір, пізніше замінений золотом.

Гематит і кіновар є найбільш поширеними видами червоної руди, кіновар основним інгредієнтом якої є HgS , вживається не тільки в живописі, а у фарбуванні. Шовковий текстиль, пофарбований кіновар'ю, знайдений в розкопках у селищі Цінтай в Хенань. Ця практика була популярною у добу династій Шан і Чжоу, але від неї поступово відмовилися в період династії Хань.

Одним з найбільш ранніх матеріалів, що використовувались для фарбування був вапняк; пізніше крейду почали змішувати з клеєм, така фарба набула широкої популярності. Для отримання червоного кольору в Китаї у період воюючих царств Цинь і Хань широко використовували марену, досить їдкий барвник. При нанесенні безпосередньо на тканини він давав жовтий колір. При змішуванні з посередниками, такими як природні галуни чи попіл згорілої соломи/дерева можна було отримати різні відтінки червоного кольору.

Барвник на основі кори саппан-дерева (від блідо-жовтого до бежевого) почав використовуватись в Південно-Східній Азії і районі Ліннань сучасного Гуандун. Він набув поширення в китайській глибинці в період династій Вей і Тан. З часом цей барвник у великій кількості почали імпортувати, він справив величезний вплив на техніку фарбування тканини в Китаї [4].

Сафлор фарбувальний, або американський шафран (дикий шафран / фарбувальний чортополох) за легендою був ввезений в Китай з Центральної Азії дослідником Чжан Цянь у другому столітті до н.е. Квіти сафлору містять жовту і червону фарбувальну речовину. Перша може бути вилучена водою. Вона має кислу реакцію, гіркий смак, характерний запах, сильну фарбувальну здатність, але не зберігається на повітрі, де переходить в буро-жовтий колір. Друга – червоний барвник кармаїн. Це – аморфний порошок буро-червоного кольору із зеленуватим металевим відливом, малорозчинний у воді, нерозчинний в ефірі, з винним спиртом, що дає розчин пурпурно-червоного кольору. Сафлор є найбільш ефективним в якості барвника при застосуванні у кислому розчині. В Китаї його використовували також у кулінарії – про сафлорове печиво були записи ще в період династії Вей (386–534) [4].

Гарденія жасміновидна використовувалась в якості жовтого барвника в період династії Хань, квітка цієї рослини містить дві речовини, одна геніпін, речовина, що може закріплювати барвник, інша – кроцин, безпосередній барвник. У збірці «Книга пісень», яка належить до антології китайської класичної поезії, сказано: «Збирати зелене листя весь день, не достатньо, щоб заповнити кошики». Під «зеленим листям» тут мається на увазі китайська трава артраскон колючий (*Hispid arthracon*). Ця рослина теж використовувалась як барвник з давніх часів, вона містить лютеолін, жовту речовину із кристалічними з'єднаннями. При використанні міді в якості закріплювача, вона дає темно-зелений колір; у поєднанні з деревної золою – жовтий колір.

Барвник індиго, отриманий з листяних рослин роду індиго (китайською «лань»), відомий синім кольором. Про це свідчить китайська ідіома: «Синій отримують з рослин індиго, але він блакитніший за саму рослину». Цей барвник почали застосовувати на початку періоду Вей і Цзінь-династій. Перша згадка про індиго зустрічається в «Книзі пісень». Тут у розділі «Пісні царства Чжоу і країн, що лежать на південь від нього» сказано: «Я провела весь ранок, збираючи індиго. Я не набрала його стільки, щоб наповнити поділ своєї спідниці». В «Записах про обряди» йдеться, що «у другому місяці забороняється збір індиго для фарбування, тому що час збору не настав» [3, с. 111]. Найчастіше для отримання барвника індиго використовували такі види рослин як стробілянт, індігофера красильна і вайда красильна. Хімічний аналіз барвників тканин з Ноін-Ули, Ільмової паді, Здзін-Гола, Пальміри і Мавандуй підтверджує широке вживання індиго в час династії Хань [1, с. 3].

Усі описані способи не вичерпують набір методів нанесення малюнків на шовкову тканину на Далекому Сході. Шовк відкрив широкі можливості як для вдосконалювання технології виробництва, так і для художньої творчості, а деякі прийоми використовуються і до цього часу в різних країнах світу.

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Qualification of crimes committed in participation according Criminal Code of Ukraine

Abstract: The article is devoted to the criminal and legal problems of qualification of crimes committed in participation. Both general and special rules of qualification of crimes committed accessories offer on the basis of positions to Criminal Code, taking into account their kinds, forms of participation, degree of completeness of crime (preparation to the crime, encroaching upon a crime) and taking into account influence of separate signs of syllables of crimes on qualification of acts of accomplices.

Keywords: qualification of crimes, accessories in a crime, form of participation, corpus delict.

A crime can be committed as one, so simultaneously and by a few persons. Most articles of Special part of the Criminal code of Ukraine (farther is CC) foresee criminal responsibility for crimes committed individually. For this reason at the commission of crime by joint efforts a few persons (in participation) legal opinion of committed up to a point is complicated, as requires qualification of act each of accessories in such crime.

In accordance with Article 26 CC criminal participation are intentional common participating of a few subjects of crime in the commission of intentional crime. According to Part 1 Article 27 CC accessories in a crime, next to a performer, are an organizer, instigator and accessory.

1. In accordance with Parts 1 and 2 Article 29 CC a performer (accessory) is subject to criminal responsibility after the article of Special part of CC, that foresees a committed by him crime; an organizer, instigator and accessory, is subject to criminal responsibility after corresponding part of Article 27 and by the that article (by part of the article) of Special part of CC, that foresees a crime committed a performer. Thus the act of performer of crime (i.e. person that in participation with other subjects of crime directly or by the use of other persons, that under the law not subject to criminal

responsibility for committed, committed crime, foreseen CC) is characterized only after the article (by part of the article) of Special part of CC. The acts of other accessories (organizer, instigator and accessory) are characterized after corresponding parts of Article 27 CC that regulate the act of such accessories, and by the article (by part of the article) of Special part of CC, that foresees a together committed crime.

It should be noted that cases take place in inquisitional-judicial practice, when one accessory carries out a few roles in the general commission of crime (for example, role of instigator and accessory; instigator and performer). First, that it is necessary to find out the act of such accessory during qualification – to set it which one roles he carried out, i.e. to find out the type of participation (Article 27 CC), and secondly, to recreate it in the formula of qualification (to carry out reference to digital denotation (the number) of the article (of part (of point) of the article) of Special part of CC, and sometimes and General part of CC that foresee committed a person act, on such *rules*:

a) if the partner of general commission of crime carried out a few roles and including role of performer (accessory) – qualification of its act must come true only after the article (by part of the article) of Special part of CC. At the same time, all roles accomplished by such partner of general commission of crime register in an explain part of corresponding judicial documents and taken into account at awarding punishment to it;

b) if accessory at the commission of crime carried out a few roles that behave to so-called «other types of accessories» (for example, role of instigator and accessory), then in the formula of qualification each is recreated of these roles. Qualification of acts of such accessory comes true after corresponding parts of Article 27 CC that regulate the roles of certain types of accessories, and by the article (by part of the article) of Special part of CC that foresees responsibility for a together committed crime [1].

2. At the commission of crime in participation it is necessary also to find out the form of participation (i.e. method of cooperation of accessories, that shows, how intentional acts two or more subjects unite in one crime), as it, in most cases, has a fundamental value for qualification of such act [2]. In accordance with Article 28 CC a crime in participation can be committed: a) by the group of persons (without a previous plot); by the b) group of persons on a previous concert; c) by the organized group; d) by criminal organization.

A crime confesses such that is committed *the group of persons*, if in it a few (two or anymore) performers participated without a previous plan between them (P. 1 Article 28 CC). At the commission of crime characterized the group of persons (simple participation) of act of every accessories after the corresponding article (by part of the article) of Special part of CC. Thus, if the indicated form of participation is foreseen as a characterizing sign of certain corpus delict, then the acts of accessories are characterized after corresponding part of the article of Special part of CC that foresees such characterizing sign. It should be noted that if the indicated form of participation is not neither basic nor characterizing sign of certain corpus delict, then in accordance with P. 2 Part 1 Article 67 CC of commission of crime without a previous plan *is not taken into account* the group of persons, as a circumstance that burdens punishment.

A crime confesses committed *on a previous agreement the group of persons*, if it was together accomplished by a few persons (two or anymore) that in good time, i.e. to beginning of crime, arranged about is general commission (P. 2 Article 28 CC). A crime admits committed *the organized group*, if a few persons (three and anymore), that preliminary co-organize in a proof association for this commission and other (additional) the crimes, incorporated by an only plan with distribution of functions of the participants of group, sent to the achievement of this plan well-known to all participants of group (P. 3 Article 28 CC), participated in its preparation or commission. At the commission of crime by the group of persons on a previous concert or qualifications are subject the organized group of act of accessories after the article (by part of the article) of Special part of CC, that foresees responsibility for a crime committed in the corresponding form of participation, in case if it is foreseen as an obligatory or characterizing sign of such corpus delict. Thus during qualification of act of certain accessory it is necessary to take a that role that he executed in a general crime into account, and, in case of necessity, also to refer to corresponding part of Article 27 CC, that foresees the act of such accessory.

If the indicated forms of participation are not neither basic nor characterizing signs of certain corpus delict, then in accordance with P. 2 Part 1 Article 67 CC of commission of crime by the group of persons on a previous agreement or admits the organized group by a circumstance that burdens punishment [3].

A crime admits committed criminal organization, if it is accomplished by the proof hierarchical association of a few persons (five and anymore), members of that or structural parts of that on a previous agreement co-organized for joint activity with the

aim of direct commission of serious or especially heavy crimes by the participants of this organization, or guidance or co-ordination of criminal activity of other persons, or providing of functioning of both criminal organization and other criminal groups (P. 4 Article 28 CC). During qualification of acts of organizer and participants of criminal organization it is necessary to follow such *rules*:

a) creation of criminal organization and participating in it form the independent corpus delict foreseen to the Article 255 CC. In addition, in the articles of Special part of CC the special types of criminal organizations are regulated for creation or participating criminal responsibility (for example, band (Article 257), terrorist group or organization (Article 258-3) and others like that) is foreseen in that. Thus, the acts of organizer and participants of criminal organization are subject to qualification after the article of Special part of CC that foresees responsibility for creation or participating in the certain type of criminal organization;

b) organizer of criminal organization is subject to criminal responsibility for all crimes committed such organization, if they were embraced by his intention. The participants of criminal organization are subject to criminal responsibility for crimes, in preparation or commission of that they participated. In this connection, the acts of organizer and participants of the organized group are also subject to qualification and after the articles (by parts of the articles) of Special part of CC, that foresee responsibility for crimes that was accomplished by such organization. Thus, in the formula of qualification, in case of necessity, it is necessary to mark corresponding part of Article 27 CC that foresees the act of certain accessory – organizer, instigator or accessory.

It should be noted that in accordance with P. 2 Part 1 Article 67 CC of commission of crime *does not admit* criminal organization by a circumstance that burdens punishment, as at that rate, if corresponding criminal organization accomplished one or a few crimes, awarded punishment on the special rules – after totality of crimes.

3. By general rule of limit of responsibility of accessories determined by the limits of act of performer, for this reason at the commission of to them unfinished crime (preparation is to the crime or encroaching upon a crime) other accessories is subject to criminal responsibility for participation in an unfinished crime. At that rate the acts of accessories are characterized after corresponding part of Article 27, that foresees description of act of certain accessory, P. 1 Article 14 or P. 2 or 3 Article 15 CC, that foresee the type of unfinished crime (preparation to the crime, complete or unfinished

encroaching upon a crime) and by the corresponding article (by part of the article) of Special part of CC, that foresees responsibility for a complete crime.

4. According to p. 3 Article 29 CC of sign, that characterize the person of separate accessory in a crime, belong in guilt *only* to this accessory. The brought statutory provision over testifies that signs that characterize the person of certain accessory and influence on qualification of crime are subject to the relation in guilt only this accessory, regardless of that or other accessories knew about the presence of such signs. For example, if a performer committed crime repeatedly, and other accessory (organizer, instigator or accessory) commit crime first, then the sign of repeated of commission of crime is taken into account during qualification only of act of performer.

5. Identical reasons (internal motives that is followed by a subject at the commission of crime) and whole (conceivable result a subject aspires to that, committing crime) acts of accessories, if they are marked in disposition of the corresponding article as to the duty or characterizing signs of certain corpus delict, are the necessary condition of qualification of their acts after the same article (by part of the article) of Special part of CC.

At the same time there are possible cases in inquisitional-judicial practice, when accessories at the commission of general crime follow different reasons and (or) pursue different aims. Consider that at that rate during qualification it follows to go out from that depending on the legislative fixing of signs of subjective side of certain corpus delict reason and aim can carry out a different role, namely to come forward as signs: a) to the duty (basic), b) characterizing, c) privileged, d) such that soften or burden punishment.

If reason or aim are the obligatory signs of corpus delict, then their absence in the act of accessory eliminates criminal responsibility for committed in connection with disparity of signs of actual publicly dangerous act to the signs of corpus delict foreseen by the corresponding article (by part of the article) of Special part of CC. If reason or aim are the characterizing signs of certain corpus delict, then their absence in the act of accessory does not eliminate criminal responsibility, and only pulls qualification committed after other article (by part of the article) of Special part of CC. In case if reason or aim is foreseen neither mainly, nor in the privileged nor in skilled compositions of crimes, then reason and aim are taken into account at awarding punishment as circumstances that soften or burden punishment, or such that characterize a person guilty.

The resulted grounds to set the *rules* of taking into account of reasons and aims of act each of accessories during qualification of committed crime:

1) reasons that was followed by a performer, and aims that he pursued influence on qualification of acts of other accessories only subject to condition, if : a) they are the obligatory or characterizing signs of *corpus delict*; b) accessories followed them or pursued them; c) accessories did not follow them though, but realized their presence. The marked approach answers P. 3 Article 29 CC, according to that circumstances, that burden responsibility and foreseen in the articles of Special part of CC as signs of crime, that influence on qualification of actions of *performer*, belong in guilt only to accessory that realized these circumstances. Thus, even, if accessory participated in a general crime, following other reasons (pursuing other aim) that does not influence on qualification, then at realization to them of the above-mentioned signs, his action it is necessary to characterize after the that article (by part of the article) of Special part of CC, that foresees a crime committed a *performer*;

2) reasons and aim, that is followed by so-called «other accessory» (organizer, instigator, accessory), carrying out the criminal role, belong in guilt and taken into account during qualification of his act or at awarding punishment. Thus they can have a double value:

a) if they are the obligatory or characterizing signs of *corpus delict* committed in participation, it determines qualification of acts of such accessories after the corresponding article (by part of the article) of Special part of CC;

b) if aims and reasons that is followed by so-called «other accessories» are not neither obligatory nor characterizing signs of *corpus delict*, i.e. does not influence on qualification committed a performer, then they are taken into account at awarding punishment only to that accessory, that follows them, or pursues, as circumstances that soften or burden punishment, or as given, that characterize the person of such accessory.

6. The debatable is remained by a question about qualification of acts of accessories, if at a plot on the common commission of crime the obligatory or characterizing signs of his composition were not specified. For example, how to characterize the act of instigator that predisposed a performer to murder, not specifying the method of his commission, and a performer accomplished murder with the special cruelty or method dangerous for life of many persons?

In our view, the decision of this question depends on the specification of signs of corpus delict a plot took place on the commission of that accessories. So, if between accessories an agreement took place about the commission of certain crime (for example, murders, thefts, shakedowns), and a performer accomplished this crime at presence of characterizing (aggravating) signs (for example, special cruelty; violence dangerous for life and health of person), then to characterize the act of accessories taking into account this sign, it is possible only subject to condition, if they: a) beforehand knew about the presence of such sign (in particular, realized beforehand, that negotiate about murder of woman that is in the state of pregnancy) a plot took place exactly on the commission of this crime, or b) on the circumstances of business realized possibility of presence of such sign and assumed the commission of such crime (for example, predisposing a performer to murder, an instigator assumed possibility of the use of different methods of murder a performer, including dangerous for life of many persons). The brought suggestions over of qualification answer the binding overs of P. 3 Article 29 CC, in accordance with what circumstance, that burden responsibility and foreseen in the articles of Special part of CC as signs of crime, that influence on qualification of act of performer, belong in guilt only to accessory that realized their presence.

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Search structural forming emotions in adolescence

Abstract: In the article we deal with emotional development of a person during teenage as correlation of progressive and regressive emotional expressions. Emotions in adolescence present a complex dynamic structure including the spectrum of ambivalent, sthenic and asthenic emotional states.

Keywords: emotion, emotional development, adolescent age.

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Поиск структурообразующих эмоций в подростковом возрасте

Аннотация: В статье представлена сущность эмоционального развития личности в подростковом возрасте как соотношение прогрессивных и регрессивных эмоциональных проявлений. Эмоции в подростковом возрасте образуют сложную динамичную структуру, включающую спектр амбивалентных, стенических и астенических эмоциональных состояний.

Ключевые слова: эмоции, эмоциональное развитие, подростковый возраст.

Эмоциональные явления отличаются богатством содержания, специфичность которого определяется психотипом личности, который, в свою очередь, зависит от ряда факторов: наследственности, условий жизни, влияния культуры и воспитания. Подростковый возраст является важным периодом в развитии личности, в частности, в развитии эмоций. Эмоциональная сензитивность растущих людей служит ресурсом для последующей жизни человека как личности. В связи

с этим научный интерес представляет проблема структурообразующих эмоций, поиск которых издавна привлекает внимание ученых. По количеству ведущих эмоций теории можно подразделить на моно- и поли-ориентированные. Так, в структуре невротической личности главной эмоцией считается тревога, доминирующая в переживаниях. Имеются попытки вывести наиболее здоровую эмоцию, к которой традиционно причисляют радость. В культурологическом контексте интерес представляет страдание, как базовая эмоция, определяющая ментальность, например, русского человека, а также – гордость, связанная с национальным самосознанием и патриотизмом. Двухмерные модели эмоций демонстрируют врожденный и приобретенный уровни эмоциональных явлений. К первому относят эмоции, несущие мотив познания – любопытство, интерес, удивление, ко второму – более сложные, комплексные сплавы эмоций – любовь, ненависть, ревность.

Недостатком множества западных теорий (по [1]) является невнимание к спокойствию как показателю уравновешенности, сбалансированности эмоциональной сферы личности. Спокойствие возможно рассматривать в различных трактовках: как психический склад личности, обусловленный влиянием черт темперамента и характера, состояние отсутствия актуальных потребностей, баланс потребностей и возможностей, реализацию целей, показатель эмоционального интеллекта.

Идея множественности базовых эмоций нашла отражение в представлении о континуальности эмоциональных явлений, которое означает, что нет критического момента исчезновения или поглощения одной эмоции другими. Спокойствие может означать центральную часть спектра, точку пересечения разнонаправленных эмоций.

Базовые эмоции в подростковом возрасте полимодальны, среди них доминируют «чувство взрослости», эмпатия, тревожность, «подростковый комплекс» эмоциональности, включающий эгоистичность, депрессивность, критичность к себе и другим, социальные эмоции – дружба и любовь, переживания одиночества [3], [5], [6]. Полимодальность также проявляется в эмоциональных нарушениях, к числу которых относят эмоциональный стресс, аффект неадекватности, страх, агрессию, ипохондрический синдром. В целом для подростков обоих полов характерны легкая возбудимость, резкая смена настроений и пере-

живаний, импульсивность в поведении, маскировка безразличием тревоги, волнения, огорчения, однако имеются половые различия: девочкам в большей мере свойственны эмоциональные нарушения в форме обидчивости, плаксивости, беспрерывным сменам настроения, эмоциональность мальчиков становится более выразительной, в поведении проявляется суетливость [3].

Центральным образованием в эмоциональной сфере подростка является «чувство взрослости», проявляемое как субъективное переживание готовности быть полноправным членом сообщества взрослых, выражающееся в стремлении к самостоятельности, желании доказать «взрослость», добиться уважения и учета мнения подростка со стороны старших по возрасту [5].

«Аффект неадекватности», описанный сотрудниками лаборатории Л.И. Божович, представляет собой бурную неуправляемую реакцию, не соответствующую по выраженности проявлений поводу ее возникновения. Данный феномен характеризуется несоответствием завышенной самооценки и уровня притязаний реальным возможностям личности, стремлением сохранить самоуважение и особый статус в коллективе [3].

Депрессивным состояниям способствует противоречивость в настроениях, побуждениях и желаниях подростка, истощающая психические ресурсы. Возможен вариант переживания депрессии без открытой демонстрации и явной реакции на утрату. Однако подростки стремятся вести при этом активный образ жизни, характеризуемый поспешностью в завязывании новых эмоционально окрашенных отношений. По мнению психоаналитиков, депрессия есть нормативная реакция на сепарацию [2]; [4], которая сменяется улучшением эмоционального состояния при переходе из подростковой фазы развития в юношескую.

Эмпатические переживания по своей направленности выражаются в гуманистической и эгоцентрической форме эмпатии. Ее дефицит нередко является следствием эмоциональной глухоты родителей, проявляемой в равнодушии к переживаниям и настроению детей, их мыслям и чувствам, что впоследствии приводит к равнодушному отношению подростка к переживаниям других людей [3].

«Подростковый комплекс» эмоциональности представляет собой новообразование выраженных психологических особенностей возраста, включающее

колебания настроения – от безудержного веселья к унынию и обратно – без достаточных причин, а также ряд других попеременно выступающих полярных качеств.

Социальные эмоции как переживание человеком своего отношения к окружающим людям являются важным достижением возраста [3]. Их развитие происходит на фоне развития самосознания, положительной мотивации и предполагает не только овладение определенным объемом знаний (нормами поведения, оценочными категориями, культурными символами), но и выработку отношений, которые могут быть названы эмоциональными эталонами, имеющими при принципиальной однородности специфические отличия, накладываемые конкретным обществом и культурой.

Дружба и любовь обусловлены возникшей потребностью в глубоких межличностных отношениях. Подростки довольно часто допускают ошибки в выборе объекта. Главными факторами аттракции выступают физическая привлекательность и социально-демографические характеристики партнера. С физической привлекательностью тесно связаны иллюзии подростков относительно ценности объекта симпатии. Сходство социально-демографических характеристик подростков – социального и экономического статуса, близости территории проживания, этнической и религиозной принадлежности – влияет на укрепление социальных установок и стереотипов, укрепляет симпатию, подтверждая непротиворечивость внутренней картины мира партнеров.

Любовь базируется на модели привязанности и новых функциональных возможностях (символизации процесса взросления ребенка, упрочении различий между мужчиной и женщиной с целью их соединения по принципу комплементарности, подготовке к переживанию более сложных чувств между мужчиной и женщиной). Проявления любви мальчиков и девочек разнообразны, любовь обнаруживается в близости ненависти и ревности, в платонических переживаниях, перерастающих в эротическое и сексуальное влечения [6]. Как симптом или символ она обозначает переход подростка к взрослости и подражание зрелым формам поведения.

Чувство ненависти выполняет защитную функцию, предохраняя от негативного опыта – специфический механизм чувствования, при котором ненависть является проявлением любви [6]. Первая любовь подростка часто переходит в ненависть или, напротив, вырастает из нее.

Ревность часто сопровождает влюбленность в подростковом возрасте: оба эти чувства способны переходить одно в другое, так как ревность связана с угрозой потери любви и привязанности другого человека, и страхом потери себя в результате разрыва симбиотических отношений, что ассоциируется с собственной смертью. Чувства любви и ревности практически слиты. Задачей в данном контексте является развитие идентичности и позитивного самоощущения человека [6].

Переживание одиночества возникает вследствие неуверенности в собственных силах, также оно может сопутствовать сепарации при переходе на новый уровень личностного развития.

Страхи имеют возрастную специфику, среди них преобладают страх смерти родителей и связанные с ними страхи общественных бедствий, например, войны. Другая группа распространенных подростковых страхов – страх собственной смерти, пожара, агрессии. Имеются гендерные различия среди подростков в реакциях страха и тревоги: так, у мальчиков чаще отмечается страх болезни, у девочек – боязнь стихий, замкнутого пространства и высоты, в целом у подростков-девочек уровень страхов выше по сравнению с мальчиками [3].

Симптоматика ипохондрического синдрома состоит в неоправданных и преувеличенных жалобах на неудовлетворительное физическое состояние.

Структура и проявление определенных форм агрессии в подростковом возрасте обусловлены возрастными и половыми свойствами. Мальчики-подростки отличаются выраженностью всех форм агрессивного поведения, по сравнению с девочками.

Сложно выделить единую базовую эмоцию в подростковом возрасте, однако наиболее характерным состоянием, на наш взгляд, является беспокойство или эмоциональный стресс. Структурообразующие эмоции в подростковом возрасте представлены в полимодальности, сложном соотношении прогрессивных и регрессивных тенденций. Данный контекст нашел отражение в характере образований эмоциональной сферы и кризисных переживаний [7].

К эмоциональным проявлениям мы относим: 1) *образования эмоциональной сферы* – «чувство взрослости» (переживание ответственности, новой роли, эмпатии, социальных эмоций, положительной мотивации, предметных и обобщенных чувств, эмоционального стресса) и «подростковый комплекс» эмоциональности (импульсивность, сензитивность, одиночество, личные переживания

– феномены дружбы и любви); 2) *кризисные переживания* (тревожность, страх, агрессию, депрессию, одиночество, аффект неадекватности, ипохондрический синдром). Образования эмоциональной сферы носят прогрессивный характер эмоционального развития, кризисные переживания – регрессивный характер.

Таким образом, эмоции в подростковом возрасте образуют сложную динамичную структуру, включающую спектр амбивалентных, стенических и астенических, прогрессивных и регрессивных эмоциональных состояний. Отсутствие стойкого состояния спокойствия предполагает движение, структурную перестройку, неспособность к самостоятельной организации и контролю эмоциональных явлений, неравновесное состояние эмоциональной сферы личности.

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About complicity

Abstract: This article deals with the Institution of complicity in the Criminal Law of Ukraine. The definition of complicity with the next assignment of its objective and subjective signs are analysed. Types of accomplices and peculiarities of their liability and the main theories of complicity, namely accessory theory and the theory of self-responsibility are characterized.

Keywords: complicity of crime, types of accomplices, forms of complicity, criminal liability of accomplices.

An institute of complicity is one of most essential and difficult in the theory of criminal law. Criminal activity, as well as every activity of man, can come true both alone and by the group of persons, and even certain organization of people with the ramified structure component elements of that, provided with different criminal "rights" and "duties", with hierarchical guidance.

From data of the UNO, criminality in the world from the end of 90th on the average increased on 5 % in a year, an increase of population was 1 % in a year. Last years in the world about 500 million crimes register oneself annually [1]. Indisputable is circumstance that parts of crimes in a kind their latentness remained unregistered, therefore these numbers are considerably higher in actual fact.

Punishment always was one of basic institutes of criminal and legal politics of the states. By means of punishment the main task of criminal law is executed - protective.

On the different stages of becoming of the state depending on its socio-economic development, political mode, culture, public sense of justice and another associate factor before punishment different socially-meaningful aims were put: frightening, punishment, retribution, warning of crimes, correction of criminals and even their re-education.

Not requiring an obligatory decline or increase of punishment of certain types of accessories, a criminal law acknowledges that a type of accessory is this important circumstance of individualization of punishment.

Traditionally, most dangerous among accessories figure of organizer, that, by general rule, must bear the most responsibility.

Criminal complicity showing up in one or another variety of criminal group (form of complicity) also has a substantial value for the criminal and legal estimation of accomplished. Compositions of crimes, skilled on the sign of their commission the group of persons, are widely used in Criminal Codes, by the group of persons operating on a previous agreement, by the organized group.

In addition, the forms of complicity are taken into account as a circumstance, aggravating punishment.

Creation of criminal organization (criminal society) is foreseen as an independent crime.

Commission of crime in composition one or another group: group form without a previous agreement; group form on a previous agreement; organized group; by criminal organization (by criminal society), draws not only severer punishment but also influences on possibility of taking committed to the category of crimes of certain weight. For committing crime of different weight not only different punishment is foreseen but also different limitations, terms of conditional and pre-term release are set and etc.

Considerable group of scientists [2] supposes that the crimes accomplished in complicity present the heightened danger for society. Group encroachments create a threat or related to actual infliction of more serious damage to the guarded interests, thus these interests and caused damage to them can be by the nature any, depending on a certain crime.

Science of criminal law is known other points of view. In opinion of M. D. Sharгородskii [3], complicity responsibility does not strengthen and does not weaken, and in general it is not a characterizing or aggravating circumstance.

The third approach can be named compromise. It consists in that complicity promotes the public danger of crime, though not under all circumstances.

It appears that the public danger of group and, as a result, organized criminality cannot be underestimated, therefore we cannot agree with opinion those authors, that suppose that a group crime does not draw strengthening of criminal responsibility. The

estimation of heightened public danger of group criminal activity from the side of legislator must show up in the strict enough measures of punishment, especially at the committing of severe and especially severe crimes. Not only the aims of punishment must be pursued in this approach but also realized principle of prevention.

The Socially-legal value of institute of criminal complicity consists in the necessity of establishment of heightened security of the objects, guarded by a criminal law, from the encroachments carried out in complicity, and also in providing of possibility of differentiation and individualization of responsibility and punishment depending on character and degree of complicity of person in the commission of crime.

Development and perfection of institute of complicity are special it is important for society and state presently, when wide distribution was got by the organized crime in many cases acquiring more transnational character.

It is set numerous researches, that group crimes present an heightened danger for society. In this connection appears reasonable and necessary their selection in a criminal law. It can come true on different directions: pointing as a circumstance, aggravating punishment, establishment of severer responsibility in regard to the most active participants of crime, criminalization of the acts sent to organization of the most dangerous forms of complicity and etc.

Underestimation of danger of the crimes accomplished in complicity obvious. It is expressed from one side in unclear or incomplete regulation of row of questions of complicity and, on the other hand, in establishment of the strict not enough measures of criminal responsibility for crimes, accomplished in complicity. Investigation of it in practice is a presence of incorrect court decisions as evaluated by the role of persons participating in a crime, error, in qualification of acts, impossibility on occasion bringing in to responsibility of organizers of crimes and other negative consequences.

For perfection of criminal statute in area of responsibility of accessories, approach of the systems and harmonization of legislation both in the field of decision of general questions of complicity are needed in crimes and questions of responsibility and punishment of persons, committing crime in composition a group.

However, perfection of criminal statute self on itself will not bring necessary results to counteraction of the organized crime. It is necessary to create the system of prophylaxis of both all criminality on the whole and organized crime in particular.

The intentional joint participating of a few subjects of crime admits criminal complicity in the commission of intentional crime. In this determination, following accepted

in the theories of criminal law to the method of division objective and subjective, the groups of signs are distinguished: a) objective and b) subjective.

It is necessary to mark that dividing of signs of complicity into objective and subjective, as well as at description of another criminal and legal phenomena, does not mean their mechanical tearing away from each other, and unchanging supposes organic intercommunication between them.

The permanent and obligatory sign of objective side of any corpus delict is publicly a dangerous act. For material compositions of crimes obligatory also there are consequences and causal connection between acts and consequences. All another signs of objective side (time, place, and situation, and also method, facilities, instruments of commission of crime) behave to optional and if they were embraced by intention of accessories, then, undoubtedly, must influence on their responsibility.

Objective signs of complicity: participating in a crime two or more than persons and compatibility of participating in a crime. The least number guilty at complicity are two persons, each of that is responsible and attaining the age from that criminal responsibility is possible set by a law. The compatibility means that all of them participate: a) in the commission of the same crime or as accessories, i.e. together executes the objective side of crime; b) as organizers, instigators and accomplices. In this case they, does not participate in execution the act of formative an objective side corpus delict, but either manage the commission of crime (organizer), either excite resolution to accomplish him (instigator) in other accessory or assist to its commission physically or intellectually (accomplice).

The act of every accessory stipulates the offensive of criminal result on the whole, but not to some its part. Therefore a trespass to the object or supplying with it in a danger is general, single result of joint activity of all accessories. The crime accomplished together is single and indivisible.

Complicity, as a rule, from an objective side supposes actions, but in a number of cases they can be accomplished and by inaction. Such cases are possible, if the agreement celled to the commission of crime or in the moment of his feasance was preceded inaction, but always to the offensive of criminal result.

Causal connection is an important condition of responsibility for complicity. Acknowledged such relation between the phenomena, at that one or a few interactive phenomena (reason) generate other phenomenon (investigation), causal connection.

When speech calls about the ground of corpus delict in the act of organizer, instigator or accomplice, that most specialists suppose that with general for all accessories publicly by a hazard effect coming as a result of direct actions of performer, the act of performer is causally constrained only, while acts of other accessories are not reasons, and only by the terms of offensive of this consequence.

Complicity is conceivable either to the moment of commission of crime or as joining activity in the moment of beginning of crime and during its continuation, but always to the offensive of criminal result. This position is outspoken yet on seventh Congress on a criminal law and steadily observed in the legislation of most states.

The subjective side of crime regardless of kind and form of complicity is presented always by intention, the intellectual element of that includes an awareness about the publicly dangerous pattern of not only the own behaviour but also behaviour of performer, embracing here fact of addition of efforts. The same takes place and on the side of performer. Thus the volitional element of intention consists of desire to attain a criminal result by addition of efforts or conscious assumption of result coming from joint efforts.

Intention testifies to the presence of unity of actions of participants, not only outwardly but also inwardly hardpan single will and single aspiring to the crime.

The necessary subjective signs of complicity it is accepted to name a mutual awareness about the commission of crime and co-ordination of actions of accessories. A mutual awareness corresponding to the intellectual moment of intention of accessories is characterized that each of them realizes, firstly, the fact of joint commission of crime, secondly, committed of certain, but not any crime, thirdly, publicly dangerous character of not only the act but also act of other accessories. Without this awareness every participant operates independently and answers in limits by its personally accomplished.

It is necessary at complicity that all accessories knew about the performer of crime in that they participate. Knowledge consists in that they realize those parties of criminal act, that form basic signs and elements of corpus delict. The said does not require a direct acquaintance with a performer is enough consciousness that such is, committed crime them or it will be accomplished.

Co-ordination of actions of accessories, corresponding to the volitional moment of intention, consists of mutual expression of intention and desire to participate in the commission of crime together with other person.

Co-ordination of actions arises up in the moment of conspiracy, maintenance and forms of that can be various. On maintenance it can plug in itself an agreement about the aims of crime, about the method of its commission, about the terms of drawing on criminal results and etc. The material point of conspiracy is expression of intention and desire to accomplish a certain crime or certain circle of crimes, because accessories bear responsibility for only that crime (or that circle of crimes) that was the article of conspiracy. Its form can be writing, verbal, as gestures or contracting bargains, i.e. replacing a verbal agreement. A conspiracy can be preliminary, i. e. taking place to beginning of commission of crime, or carried out in the process of such commission to its completion. At the commission of crime accessories can follow different reason and by aims.

It is necessary to say accessories about two basic theories of responsibility. One of them proves independent character of responsibility of accessories from the actions of performers; it got the name of independent theory. Other, accessory theory, insists on dependence of this responsibility.

Accessoriness expresses belonging of one phenomenon to other. Its basic postulates are expressed in the following - accessory can bear responsibility for the actions only at presence of punishable action of performer (and, consequently, can be instituted criminal proceedings against, if to it's a performer is attracted), punishability of accessory is determined by that article of criminal law, on that the actions of performer are characterized.

The said allows to mark that, at complicity, firstly, responsibility comes for the commission of single joint crime (certain dependence shows up here, accessoriness, other accessories from the actions of performer); and, secondly, the account of degree and character of complicity of each of sidekicks in the carried out encroachment is obligatory (display of individualization and independence of responsibility of accessories).

We will mark that character of activity of person is determined depending on a kind and form of complicity. A here not insignificant value such circumstances as presence or absence of previous agreement will have, commission of crime in simple co-accessoriness or with distribution of roles, level of public danger of one or another form of complicity. At joint activity of effort of participants sent to the achievement of single,

criminal result. However such unity is not necessarily expressed in the identity of compositions. Accessories is responsible only for that each of them accomplished in accordance with the orientation of intention.

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Modern approaches to the integral plans formation for training of highly qualified basketball players taking into account the influence of sport globalization factors

Abstract: The research presents the features of integral plans formation for training of highly qualified basketball players taking into account the migration of athletes as a factor of globalization. We have shown modern approaches to cope with the specified problems arising in the training process through integrated training as the most effective type of work in terms of frequent migration of basketball players.

Keywords: basketball, training, globalization, migration, plan.

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Сучасні підходи до формування інтегральних планів підготовки висококваліфікованих баскетболістів з урахуванням впливу чинників глобалізації спорту

Анотація: В дослідженні представлено особливості формування інтегральних планів підготовки баскетболістів високої кваліфікації, враховуючи міграцію спортсменів як чинник глобалізації. Показано сучасні підходи щодо подолання визначених проблем, які виникають у навчально-тренувальному процесі підготовки за рахунок інтегральної підготовки як найефективнішого виду роботи в умовах частотої міграції баскетболістів.

Ключові слова: баскетбол, підготовка, глобалізація, міграція, план.

Постановка наукової проблеми та її значення. Одним з основних чинників глобалізації, що суттєво впливає на спорт є міграція спортсменів. На сьогоднішній день складно виявити чинники, які найбільшою мірою впливають на цей процес. Це відбувається тому, що міграція спортсменів набула неконтрольованих форм, важко виявити передумови, які впливають на процес переміщень (наприклад, баскетболісти залишають економічно-стабільні країни у пошуках фінансово більш вигідних контрактів навіть в країнах «третього світу», або погоджуються на досить низький гонорар через пропозиції щодо зміни громадянства і виступу на Олімпійських іграх під прапором іншої держави). Якщо раніше кращі клуби заключали контракти з кращими гравцями, то тепер мігрувати країнами світу баскетболісти починають в достатньо ранньому віці, з різним рівнем кваліфікації та з багатьох причин. Баскетболісти в ранньому віці намагаються разом з отриманням спортивного досвіду отримати можливість навчання в закордонному коледжі; висококваліфіковані гравці змінюють клуби задля більш вигідних умов контракту; кваліфіковані спортсмени – з метою покращення фінансового становища та перспектив надбання змагальної практики в більш престижних лігах або клубах. Суттєва кількість баскетболістів намагається завдяки переходам обрати країну з метою подальшої зміни громадянства; переважна більшість гравців змінює клуби через незадоволення щодо часу, відведеного їм у грі, довіри тренера, неузгодженості дій з партнерами, що заважає продемонструвати високий рівень гри і т.п.

Через міграцію спортсменів назріло питання змін щодо нових підходів до формування планів підготовки команд і ключове місце має посісти інтегральна підготовка як найефективніший вид, адже перемога в матчі – це нагорода за гру, яку можна отримати за рахунок «зіграності» баскетболістів усієї команди, тобто об'єднання зусиль, демонструючи загальний техніко-тактичний, фізичний і морально-вольовий потенціал гравців і тренера. Поєднання видів підготовки, що застосовані в ігровому і змагальному процесах, дає можливість виявити сильні та слабкі сторони для подальшого вдосконалення навчально-тренувального процесу, проаналізувати і зробити максимально реалістичні висновки щодо внесення змін у поточний план підготовки.

Аналіз досліджень даної проблеми. Педагогічний аналіз планів підготовки чоловічих і жіночих збірних команд України (кадетських, юніорських, молодіжних, національних) свідчить про наявність досить незначних об'ємів роботи, які відведено на інтегральну підготовку – 12-15% [3]. Враховуючи, що національні

збірні команди мають обмежений час на підготовку через виступи більшості гравців за клубні команди і фінансово-економічні можливості федерації баскетболу України, саме інтегральна підготовка може сприяти досягненню позитивних ефектів у навчально-тренувальному процесі [1,4]. Вплив чинників глобалізації на спорт вищих досягнень є предметом наукових розвідок вітчизняних і закордонних фахівців [2,5].

Мета і задачі дослідження – визначити сучасні особливості створення планів інтегральної підготовки висококваліфікованих баскетболістів з урахуванням чинників глобалізації.

Виклад основного матеріалу і обґрунтування отриманих результатів дослідження. Інтегральна підготовка – це єдина система тренувальних впливів, покликана реалізувати тренувальні ефекти окремих сторін підготовки (фізичної, технічної, тактичної, психологічної, теоретичної) в змагальній діяльності для реалізації стратегічних завдань командної спортивної боротьби.

Інтегральна підготовка передбачає:

- цілеспрямовану роботу над вдосконаленням окремих якостей або сторін підготовленості;
- забезпечення злагодженості комплексних проявів всіх сторін підготовленості в змагальній діяльності.

Одним з провідних чинників інтегральної підготовки баскетболістів є виконання завдань з інтенсивністю, що моделює змагальні навантаження, яка близька або перевищує їх за кількісними та якісними показниками. В процесі тренування використовують зменшення пауз відпочинку між ігровими фазами, зменшують час пояснення і т.п., що дозволяє підвищити інтенсивність заняття.

Кожна зі сторін підготовленості баскетболістів у визначеній мірі формується внаслідок вузько спрямованих методів і засобів. Загальновідомо, що окремі якості та здібності, що проявляються в локальних вправах, не можуть в повному обсязі бути представленими в змагальній діяльності. Для цього необхідний важливий розділ підготовки, спрямований на об'єднання сторін підготовленості, якостей і здібностей. Основне завдання інтегральної підготовки баскетболістів - забезпечити злагодженість і ефективність комплексного прояву багатогранних складових, які в сукупності визначають успішність змагальної діяльності.

Разом з тим, для повноцінної інтегральної підготовки баскетболістів, яка передбачає комплексне удосконалення різних видів підготовленості, доцільно виокремити наступні важливі напрямки:

- удосконалення індивідуальних техніко-тактичних дій;
- удосконалення здібностей до максимальної реалізації функціональних можливостей;
- удосконалення здатності до переходу від максимальної рухової активності до періодів відносного відпочинку для забезпечення високої працездатності в змагальному процесі.

Інтегральна підготовка спроможна посилити весь комплекс здібностей спортсмена до прояву якостей, необхідних для демонстрації високих результатів. Подібний стан визначає підготовленість баскетболістів, включаючи високий рівень тренуваності та інших складових майстерності: теоретичні знання, психологічну впевненість і рівновагу.

Для планомірного сприяння зростаючому функціональному потенціалу баскетболістів протягом сезону обсяг засобів інтегрального впливу в річному циклі має збільшуватись із наближенням до відповідальних зустрічей, а в багаторічній підготовці – на етапі максимальної реалізації індивідуальних можливостей.

В спортивних іграх взагалі, та в баскетболі зокрема, основними засобами інтегральної підготовки є змагання різного рівня (від навчально-тренувальних до офіційних включно). На етапі максимальної реалізації індивідуальних можливостей, високий рівень спортивної майстерності досягається шляхом надбання відповідних кількісних показників офіційної змагальної практики різних рівнів. Це той випадок, коли кількість сприяє якості гри, вдосконаленню окремих технічних елементів і відпрацюванню тактичних схем. Спеціальні та додаткові вправи на техніку, тактику, фізичну досконалість і штучне психологічне навантаження не мають такого стійкого ефекту як отриманий досвід, що набутий в спортивній боротьбі, коли іншого значення набуває відповідальність за гру, суддівство, присутність глядачів і т.п.

Проведення навчально-тренувальних ігор, в умовах, що максимально наближені до офіційних змагань, вимагає постановки і вирішення конкретних завдань:

- закріплення техніко-тактичних дій, вивчених раніше в індивідуальних, групових і командних вправах;

- відтворення умов змагальної боротьби;
- моделювання тактичних схем гри з майбутнім суперником;
- підготовка і перевірка запасних гравців для гри в основному складі.

Ефективними на тренуваннях є змагання команд, що сформовані з двох або трьох гравців, що надає підвищення інтенсивності ігровим вправам і напруженості, а також в ситуації, коли команда з меншим чисельним складом грає проти команди, укомплектованої більшим числом гравців (за умов приблизно рівної кваліфікації та підготовленості).

З метою підвищення ефекту від інтегральної підготовки застосовують методичні прийоми, які ускладнюють або спрощують змагальну діяльність:

- ускладнення умов за рахунок обмеження розмірів майданчика, більшої кількості захисників, м'ячів при виконанні ігрових вправ; застосування вправ з примусовим лідерством з метою формування вольових якостей і відпрацювання арсеналу індивідуальної майстерності; проведення змагань з сильнішим або "незручним" суперником; проведення зборів у несприятливих кліматичних умовах і т.п.;

- полегшення умов за рахунок застосування різних моделюючих засобів (баскетбольні стійки, пасивний захист); зменшення дистанцій для виконання звичних вправ на майданчику з метою якісного зосередження на техніці виконання; організація і проведення змагань із слабкішими або "зручнішими" суперниками з метою відпрацювання тактичних схем або підняття самооцінки гравців;

- інтенсифікація інтегральної підготовки за допомогою збільшення розмірів майданчика, зменшення часу володіння м'ячем, збільшення тривалості змагальної діяльності.

Значна роль у вирішенні завдань інтегральної підготовки відводиться вправам спеціально-підготовчого характеру, які максимально наближені за структурою і особливостями діяльності функціональних систем організму до змагального процесу. На навчально-тренувальних зборах важливе систематичне моделювання факторів, що відволікають увагу (наприклад, виконання техніко-тактичних дій на тлі стомлення).

Створюючи план підготовки конкретної команди, важливо зрозуміти, що в сучасних умовах міграції баскетболістів, коли склад клубних команд суттєво змінюється щосезону, а в національних збірних командах наявні вимушені зміни че-

рез віковий ценз, рівні підготовленості та тактичні вподобання тренерів, саме інтегральна підготовка дає можливість досягти найвищого навчально-тренувального ефекту.

Висновки та перспективи подальшого дослідження

1. Проаналізовано плани підготовки жіночих і чоловічих національних збірних команд України з баскетболу (кадетські, юніорські, молодіжні та національні) до офіційних міжнародних змагань. Частка інтегральної підготовки складає 12 – 15%.

2. Виявлено, що основними підходами при формуванні планів інтегральної підготовки баскетбольних команд є наступні:

- врахування впливу чинників глобалізації спорту вищих досягнень (міграції висококваліфікованих спортсменів) на комплектацію команди, в окремих випадках, на спеціалізацію гравців і тактичні схеми ведення гри;

- попереднє визначення стану фізичної та психологічної підготовленості висококваліфікованих баскетболістів, які викликані до лав національної збірної команди з різних баскетбольних ліг, з різними кількісно-якісними показниками офіційної змагальної практики та ін.;

- формування планів інтегральної підготовки висококваліфікованих баскетболістів з урахуванням необхідності досягти високого рівня загальнокомандної підготовленості в стислі терміни.

Перспективи подальших розвідок у даному напрямку ґрунтуються на необхідності формування інтегральних програм підготовки баскетбольних команд з урахуванням індивідуальних особливостей спортсменів, їх функціонального стану, які обумовлені чинниками глобалізації спорту вищих досягнень, зокрема, міграцією висококваліфікованих спортсменів.

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***On the issue of the «war with terrorism»:
who is the enemy?***

Abstract: This work is devoted to the analysis of such phenomenon as "war with terrorism". Having defined the concept "terrorism" and its forms, authors find out that "the international terrorism" is behind the standard cliché. In relation to socio-political realities of the beginning of the 21st century, this definition is fitted by only radical Islamism which is closely connected with wahabite sectarianism.

Keywords: international terrorism, revolutionary terror, radical Islamism, wahabite Islam.

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К вопросу о «войне с терроризмом»: кто противник?

Аннотация: Данная работа посвящена анализу такого явления как «война с терроризмом». Определив понятие «терроризм» и его формы, авторы выясняют, что скрывается за общепринятым клише «международный терроризм». Применительно к социально-политическим реалиям начала XXI в., под данное определение подходит только радикальный исламизм, тесно связанный с ваххабитским сектантством.

Ключевые слова: международный терроризм, революционный террор, радикальный исламизм, ваххабитский ислам.

В наши дни угроза международного терроризма признана одной из серьёзнейших глобальных проблем. Множество конвенций и соглашений признаёт терроризм преступлением против человечества и настаивает на его недопустимости в политической и военной практике. Эксперты нередко указывают, что мир ждёт катастрофа, если ядерное оружие попадёт в руки террористов. Но при этом мало кто поясняет, что имеется в виду под терминами «терроризм» и «террористы». В 2002 г. президент США Дж. Буш-младший официально объявил войну «мировому терроризму», словно это субъект международной политики и права. Журналисты в качестве примера современных террористов приводят боевиков «Исламского государства Ирака и Леванта» и афганских талибов, но при этом родовые черты «терроризма» как явления и «террориста» как его участника почти никто не указывает. Между тем действия талибов в Афганистане и боевиков «ИГИЛ» в Ираке мало отличаются от действий любых партизан XX в., если не брать в расчет местную специфику. При этом они признаны террористами, а бойцы сирийской, так называемой, «умеренной оппозиции» - не признаны. Уго-

ловный кодекс РФ определяет террористический акт следующим образом: «Совершение взрыва, поджога или "иных" действий, "устрашающих" население и создающих опасность гибели человека, причинения значительного имущественного ущерба либо наступления иных тяжких последствий, в целях дестабилизации деятельности органов власти или международных организаций либо воздействия на принятие ими решений, а также угроза совершения указанных действий в тех же целях» (ст. 205 УК РФ). Под такое определение можно подвести практически любое устрашающее деяние, особенно, связанное с военными действиями. В данной работе мы выясним, какое реальное социально-политическое явление скрывается под популярным ныне ярлыком «международного терроризма» и как оно проявляет себя вне террористической практики. Этот анализ представляется нам совершенно необходимым, потому что невозможно бороться с кем-либо, не представляя себе противника.

Существует несколько устойчивых дефиниций понятия «терроризм», и не одно из них не юридическое. Отечественный криминалист и социолог Ю.М. Антонян определяет терроризм как следующим образом: «Под терроризмом можно понимать относительно массовое, исторически изменчивое уголовно наказуемое явление, характеризующееся совершением умышленных преступных действий с целью вызвать страх и панику с выдвиганием различных требований. Сущность терроризма сводится к активному использованию устрашения для принуждения людей (группы людей, государства, государственных учреждений, коммерческих организаций и т.д.) к действиям, выгодным террористам. Устрашение – главный инструмент террористов, умело используя который они вынуждают других, некую третью сторону действовать в интересах не общества, государства или своих собственных, а террористов. Причём, их требования могут быть неконкретными, требования вообще иногда не высказываются. Террористическая агрессия призвана создать общую атмосферу постоянного страха и изматывающего ожидания беды» [1]. Аналогично определяет терроризм американско-иранский исследователь Ф. Мохаддам: «В этой дискуссии я использую термин «терроризм» в следующем смысле: политически мотивированное насилие, совершенное индивидами, группами или агентами, спонсируемыми государством, с целью создания атмосферы террора и беспомощности у гражданского населения, чтобы повлиять на принятие решений и изменить поведение (правительства – авт.)» [2]. То есть терроризм – это политика запугивания гражданского населения той или

иной местности, страны или социальной группы с целью заставить их повлиять на решения правительства или иных руководящих органов. С этой точки зрения, вполне можно говорить о государственном терроризме, проявляющемся, например, в действиях карателей (село Хатынь в Белоруссии, сожженное вместе с жителями гитлеровцами в 1943 г.) или бомбардировках невоенных объектов («рейд Дулиттла» на японские мегаполисы в 1942 г.). Американский исследователь П. Дж. Бьюкенен выделяет следующие виды терроризма: *военный, государственный, революционный и анархический* [3].

Военный терроризм стар, как мир, и применялся в боевых действиях на протяжении всей мировой истории. Например, публичные расправы с пленными, продажа жителей захваченных городов в рабство, избиение мирного населения являются «визитной карточкой» средневековых войн, особенно, на Востоке (хотя античные полководцы такой тактикой тоже пользовались). Долгое время считалось даже, что грабёж мирного населения – неотъемлемая часть военных действий, которая не может быть запрещена. Расправы над пленными и демонстрация их тел считались действенным пропагандистским оружием. В ответ на такое обращение мирные жители создавали партизанские отряды и применяли те же самые зверские методы к оккупантам. Возможно, исследователи никогда бы не узнали об этих реалиях войны, если бы не появление военной авиации и не попытка включить террор в британскую военную доктрину. В 1925 г. английский генерал Митчелл предлагал в случае войны использовать против мирного населения вражеской страны бомбардировки с воздуха и отравляющие газы. Он полагал, что напуганное, не готовое безответно страдать за чужие интересы население объявит воюющему правительству импичмент или потребует немедленного прекращения войны. Участвовавший в дебатах тех дней английский военный теоретик Дж. Фуллер саркастически заметил: «Исходили из предположения, что люди являются трусами и если уничтожить их дома и изувечить или перебить их жён и детей, то они капитулируют» [4]. Если в 1920-30-е гг. о целесообразности стратегических бомбардировок ещё спорили, то в ходе Второй мировой войны они стали двусторонней практикой. После налётов люфтваффе на Ковентри, а королевских ВВС – на Дрезден, после «рейда Дулиттла» и атомных бомбардировок весь мир уже утвердился в мысли о том, что бомбы, падающие на гражданские районы, - обычное дело. В наши дни расправы над мирным населением

запрещены международным законодательством, но в случае обстрелов и воздушных налётов террористический умысел пилотов и артиллеристов невозможно доказать. Ведь основная особенность военного терроризма, равно как и любого терроризма вообще, - направленность на устрашение жителей вражеской страны, а не уничтожение живой силы противника. Бомбардировка жилых кварталов мегаполиса является террористическим актом, а диверсия (например, взрыв казармы или военного эшелона) – нет.

Государственный терроризм обычно направлен властными структурами против реального или мнимого «внутреннего врага». Это могут быть преследования по идеологическому или классовому признаку, притеснение национальных или религиозных меньшинств, но целью всегда является запугивание. Примером государственного терроризма могут служить публичные казни «подозрительных» и «врагов народа» во время французской революции 1789 г. или открытый геноцид евреев и славян, проводимый гитлеровцами на оккупированных территориях. В практике западного колониализма такой терроризм тоже имел место: к примеру, легендарная «охота за скальпами» спонсируемая американским правительством в XIX в. Гонения по религиозному признаку будут относиться к государственному терроризму, если осуществляются органами власти.

Революционный терроризм, по словам П. Дж. Бьюкенена, является оружием борьбы за власть, которое применяет фракция, не имеющая иных средств борьбы. Например, малочисленная радикальная партия не может ни победить на выборах, ни осуществить вооруженный переворот. Поэтому она пытается либо воздействовать на правительство через перепуганные народные массы, либо разжечь в стране гражданскую войну, и, тем самым, лишит правительство народной поддержки. Убийства чиновников и членов их семей русскими революционерами и европейскими анархистами на рубеже XIX-XX вв. с обязательной их оглаской относятся именно к революционному террору.

Анархический терроризм представляет собой одну из форм самовыражения душевнобольных людей. Это как раз тот случай, когда сумасшедший с оружием в руках мстит окружающему миру за действительные или мнимые обиды, или пытается обрести популярность каким-либо кровавым актом. Например, 27 июля 2012 г. в американском кинотеатре «Аврора» психически ненормальный Дж. Холмс открыл огонь по зрителям, предварительно одевшись, как главный

антигерой транслируемого фильма. Застрелив 12 человек, Холмс сдался полиции и пояснил своё поведение тем, что хотел «исправить» киносюжет.

Анализируя четыре указанных вида терроризма. Можно сделать вывод, что различаются они не действиями, а субъектами этих действий и целями, которые эти субъекты перед собой ставят. Например, обстрел мирного посёлка регулярной армией – военный терроризм, а тот же самый обстрел, совершенный заговорщиками, – революционный терроризм. Арест чиновника с последующим освещением этого события в СМИ как борьбы с «врагами народа» – государственный терроризм; похищение такого же чиновника душевнобольным одиночкой – анархический терроризм. Проще говоря, терроризм – это действие, но не идеология или политическая программа. Невозможно быть террористом по убеждениям, так же как нельзя быть по убеждениям каменщиком или прохожим. Председатель Совета муфтиев России Р. Гайнутдин прямо указывает, что террор – это инструмент, и только лишь: «Многие называют терроризм нашим главным врагом. А ведь терроризм – это не субъект нападения, это метод» [5]. Запрет терроризма в законодательном порядке подразумевает ответственность, которую понесут нарушители этого запрета. Если нарушителем является государство, то ему может быть объявлена война. Но 20 сентября 2001 г. президент США Дж. Буш-младший, в ответ на теракты 11 сентября, объявил войну именно мировому терроризму. С тех пор блок НАТО и сотрудничающие с ним государства (в том числе и Россия) ведут борьбу неизвестно с кем. Сложилась парадоксальная ситуация: военные действия не прекращаются, жертвы присутствуют с обеих сторон, расходуются огромные суммы денег, но противник до сих пор не назван по имени. При этом считать, что указанная коалиция борется со всеми, кто применяет террористические методы, по меньшей мере, наивно. Во-первых, многочисленные сепаратистские движения Африки и леворадикальные группировки Латинской Америки продолжают бороться за свои цели так, как они делали это всегда, в том числе и захватывая заложников, запугивая мирное население и т.д. И международное сообщество по-прежнему безразлично к этим событиям. Во-вторых, применяемые войсками НАТО против анонимного противника методы вполне подходят под определение военного терроризма. Это и бомбардировки мирных кишлаков в Афганистане, и зверские издевательства над иракскими военнопленными в тюрьме Абу-Граиб, широко распропагандированные в Internet с целью запугать потенциальных

врагов. С кем же на самом деле идёт «война против терроризма»? Кто этот неназванный враг, против которого сплотились страны западного мира и их союзники?

Когда говорят о международном терроризме, то негласно подразумевают исламистских радикалов, представленных в современном мире «Исламским государством Ирака и Леванта» и союзными ему организациями из Мали («Защитники веры»), Нигерии («Ложный запрет»), Афганистана («Талибан»), Северного Кавказа («Имарат Кавказ») и др. Десятилетием раньше авангардом международного терроризма считалась интернациональная организация «Аль-Каида» («Принцип»). Непосвященному наблюдателю может показаться, что при помощи терроризма исламский мир противится модернизации и глобализации. Не имея возможности противостоять западным странам на поле боя, мусульмане прибегают к терроризму по той же причине, по какой бойцы разгромленных армий становятся партизанами. Однако это не только слишком упрощённое, но и неверное объяснение. Ведь некоторые исламские страны, будучи противниками интеграции в мировую экономическую систему, избегают не только террора, но даже военного противостояния с кем-либо. Так, Исламская республика Иран, будучи одним из самых консервативных государств Ближнего Востока, не только избегает военной конфронтации с западными странами, но также преследует воинствующих исламистов на своей территории. Тесно связанная с Ираном шиитская милиция Ливана, именуемая «Хезболлах», не сотрудничает ни с «Исламским государством», ни с его союзниками. Также необходимо отметить, что жертвами терактов, совершаемых боевиками «ИГ», а до него – «Аль-Каиды» нередко становятся мусульмане (например, функционеры правящих режимов Сирии и Ирака). Действия адептов «Исламского государства» и аналогичных группировок не могут быть объяснены только их принадлежностью к исламскому миру.

Все эти организации совершают теракты не ради них самих, а преследуя политические цели, которые они иногда объявляют, а иногда держат в секрете. Именно эти цели помогут нам определить движение, расплывчато названное «международным терроризмом». Ортодоксальный суннитский клир отвергает саму возможность приравнивания доктрины воинствующих исламистов к традиционному исламу. Председатель Совета муфтиев России Р. Гайнутдин прямо указывает: «Лица, пытающиеся оправдать свои преступления ссылками на Ко-

ран и Сунну, только отягчают свой и без того тяжкий грех, приписывая Всевышнему свои личные пороки и ложные взгляды» [6]. Многие исламские теологи отмечают, что ислам и исламизм представляют собой явления разных порядков. Если ислам – это вероисповедание, то исламизм (панисламизм) – политическое течение, стремящееся к созданию теократического государства, которое объединит весь мусульманский мир. В той или иной форме исламизм – ровесник ислама, но, за исключением эпохи первых халифов, никогда его адептам не удавалось получить реальную власть над всеми мусульманами или ликвидировать во всём *дар аль-ислам* светские режимы. До 1924 г. духовную власть над мусульманами-суннитами имел османский халиф, а светская власть принадлежала многочисленным султанам и эмирам. Но в XX в. положение дел изменилось: традиционные политические институты исламского мира были вытеснены прозападными или просоветскими диктатурами, а халифат разрушила турецкая революция. В обстановке политического и духовного хаоса, захлестнувшего дар аль-ислам, исламисты производили впечатление патриотов и консерваторов. Начиная с зародившейся в 1920-е гг. египетской организации «Братья-мусульмане», они выступали как против светских диктаторов, так и против традиционного мусульманского духовенства, обвиняя последнее в пособничестве иностранным оккупантам и местным коррупционерам. Диапазон радикализма исламистов колеблется от современного «ИГИЛ», вооруженной рукой уничтожающего своих противников и практикующего устрашение почти ежедневно, до вполне легальной пакистанской партии «Исламский блок», борющейся за исламизацию государственного аппарата мирными парламентскими методами. Все эти движения явно или скрыто поддерживаются Саудовской Аравией, находящейся с исламистами в идейном родстве.

По мнению российских исследователей, в основе доктрины современного исламизма лежит ваххабизм, маргинальное течение суннизма, которое многие мусульманские богословы признают еретическим [7]. Основателем этого учения был теолог-ригорист Мухаммед ибн Абд аль-Ваххаб, живший в Аравии в середине XVIII в. Не вдаваясь в богословские подробности, его можно назвать обновленцем, действовавшим под лозунгами возвращения к «чистому исламу» времён пророка Мухаммеда. Вся многовековая мусульманская теология, суфизм, простонародная религиозность, халифат в его османском виде, не говоря уже о ши-

изме, были объявлены отступничеством и приравнены к язычеству («многобожию»). И сунниты, и шииты приравнивались к предателям «чистой веры», и ваххабиты по сей день относятся к ним даже более враждебно, чем к иноверцам. На протяжении XVIII-XX вв. обновленцы пытались распространить своё учение за пределами Аравии, время от времени брались за оружие и даже однажды напали на Мекку, считая её центром «идолопоклонства». В ответ весь суннитский мир заслуженно считал их сектантами-радикалами и вёл с движением вооружённую борьбу. Кроме Аравии, общины ваххабитов существовали в Северной Индии и Магрибе. Кое-где (в Пенджабе) им удавалось легально открывать медресе для преподавания академической теологии и, тем самым, «просвещать» своих учеников, отвращать их от традиционного ислама. Но нигде ваххабиты не играли серьёзной роли, даже если пытались заявлять о себе. Ситуация изменилась в 1930-е гг., когда на Аравийском полуострове была обнаружена нефть. Ваххабитское королевство Саудовская Аравия быстро разбогатело за счёт нефтяной торговли, но стало вынуждено сохранять добрые отношения со своими западными партнёрами. Получилось, что, имея для войны против «отступников» достаточно денег, ваххабиты лишились возможности воевать с кем-либо, чтобы эти самые деньги не потерять. В ту же самую эпоху суннитский мир буквально лихорадило: султаны и эмиры лишились своих тронов, традиционный клир и суннитские братства пошли на сотрудничество с европейскими колонизаторами, халифат упразднили турецкие революционеры-модернизаторы, и страны Леванта и Магриба превратились в поле битвы между исламистами и светскими реформаторами. В этой обстановке ваххабитское руководство нашло оптимальный выход: стало оказывать панисламистским партиям и движениям финансовую поддержку, не вмешиваясь в их борьбу открыто. Например, египетская партия «Братья-мусульмане», вдохновлявшаяся теократическими идеями С. Кутба, получила от Саудовской Аравии большую сумму денег на открытие учебных заведений ваххабитского типа. Аналогично развивались события в Мали: «Соборная мечеть в Бамако, стоимостью более чем 2 млрд. малийских франков, - подарок Саудовской Аравии, которая выделила также 700 тыс. долларов на строительство педагогического института арабского языка и исламской культуры в Томбукту» [8]. Понятно, по каким программам и в каком направлении велось преподавание в этом институте, если в скором времени после его открытия в Мали возникла исламистская организация «Защитники веры» («Ансар ад-дин»). Таким образом,

к концу XX в. во всём исламском мире сложились очаги ваххабитского движения. Ячейки эти имели небольшое количество адептов, но маскировка под учебные заведения позволяла им внедрять своих людей в самые разные сферы общественной жизни. Параллельно с этим Саудовская Аравия финансировала мусульманских участников арабо-израильских войн, что позволило ваххабитам избавиться от репутации еретиков. Централизованного ортодоксального клира, возглавляемого некогда халифом, уже не существовало, и сектанты могли буквально покупать себе авторитет, не опасаясь духовного противодействия ортодоксов. Однако даже в 1970-е гг. ваххабиты были далеки от международной террористической деятельности и почти неизвестны за пределами дар аль-ислам. Их радикальные, обновленческие идеалы касались только их самих.

Ситуация изменилась в ходе советско-афганской войны (1979-1989 гг.). Пользуясь одобрением западных стран, аравийские ваххабиты стали оказывать огромную спонсорскую и благотворительную помощь афганским беженцам в Пакистане, вкладывая деньги в основанные ими же ещё в XIX в. учебные заведения, получившие название «деобандских медресе». Заручившись поддержкой пакистанских правительственных кругов, ваххабиты вмешались в деятельность афганских моджахедов. Именно за их деньги были созданы тренировочные лагеря боевиков, закуплено оружие, при их посредничестве инструкторы из ЦРУ встречались со своими афганскими подопечными. Затем сектанты пошли ещё дальше: прибывший для строительства казарм и полигонов инженер-подрядчик Усама бен Ладен сумел договориться с пакистанцами о переброске на театр военных действий добровольцев из ближних и дальних арабских стран. Так впервые в истории возникли ваххабитские интернациональные отряды, подчинявшиеся не какому-то государству, а непосредственно руководителями секты. Французский исследователь Ж. Кепель так описывает деятельность ваххабитских добровольцев: «Их основная деятельность развернулась после ухода советских войск в феврале 1989 года, и её оценка была неоднозначной. В марте во время осады Джелалабада арабский контингент проявил чудеса воинской доблести, порубив на куски его защитников – «безбожников», пленных афганцев, что вызвало потрясение в рядах афганских моджахедов» [9]. В результате ваххабитского присутствия в Пакистане к началу 1990-х гг. произошли два события, напрямую связанных с будущим началом «войны с терроризмом». Во-первых, появилась во-

оруженная сила, подчиненная напрямую сектантским вожакам, минуя даже власти Саудовской Аравии и тем самым освободившая королевство от всякой ответственности за дальнейшее развитие событий. После окончания Афганской войны многочисленные ваххабитские добровольцы объединились в интернациональную сектантскую организацию «Аль-Каида», подконтрольную лишь её прямому основателю и спонсору, Усаме бен Ладену. Будучи фанатичным сектантом, тот сразу же развернул джихад, борьбу с «отступниками» и «безбожниками» и их западными покровителями. Боевики «Аль-Каиды» оставили кровавый след в Чечне и Боснии, Сомали и Кашмире, даже в северной Нигерии они оказывали помощь местным исламистским радикалам. Теракты 11 сентября 2001 г. были ударом «Аль-Каиды» по западному обществу с целью заставить его повлиять на правительства в интересах исламистского движения. Во-вторых, выпускники деобандских медресе объединились в военизированную организацию «Талибан» («Последователи») и создали для ваххабитов удобный плацдарм в Афганистане.

Казалось бы, наступил удобный момент для установления власти ваххабитов во всём суннитском мире. «Холодная война» окончена, светские режимы Леванта потеряли популярность и погрязли в коррупции, Израиль прекратил воевать с мусульманами, западные страны увлечены демократизацией постсоветского пространства. Ваххабиты оказались единственной реальной силой в исламском мире. Страны Магриба, Центральной Азии и Леванта, а также южного Сахеля были для них полностью доступны и уже частично освоены. И в этот момент выяснилось, что сектантские принципы совершенно не подходят для реальной жизни. В таких развитых мусульманских странах как Египет и Тунис ваххабиты не смогли захватить власть даже в ходе «арабской весны» 2011 г. Население доверяло им всё-таки меньше, чем функционерам скомпрометировавших себя светских режимов. Лозунг возвращения к образу жизни VII в., эпохи пророка Мухаммеда никто не воспринял всерьёз. Религиозный ригоризм ваххабитов оттолкнул от них даже тех мусульман, которые сражались с иноверцами. Так, в Кашмире местные повстанцы предпочли сложить оружие, нежели выполнить указание «интернационалистов», требовавших переодевания из европейской одежды в традиционную арабскую. В шиитском Иране ваххабитов обоснованно считают еретиками и заговорщиками и преследуют в уголовном порядке. Ограниченная популярность пришла к сектантам лишь в странах, где мусульмане не составляли большинства населения или не имели влиятельных представителей

во властных структурах. Такими странами оказались Ирак, Сомали, Афганистан и Нигерия. Причины такой географии просты. В Ираке после свержения режима С. Хуссейна установился оккупационный режим, и в ваххабитах видят освободителей, хотя параллельно с ними против проамериканского правительства действуют и светские партизаны. В Нигерии мусульмане составляют меньшинство: ислам распространён лишь среди жителей северных районов страны, народностей хауса (33% северян), фульбе (18% северян) и канури (8%). Представители именно этих племён составляют большинство боевиков исламистской организации «Ложный запрет» [10]. В Сомали и Афганистане исламистские организации «Союз исламских судов» (и его боевое крыло «Юность») и «Талибан» пресекли разгул банд и племенных вооруженных формирований, чем приравняли себя к представителям законной власти. И тут же продемонстрировали свою непригодность для управления этими странами, так как пуританский ислам не вызывает понимания у представителей иных культур. Так, сомалийцы были разочарованы насаждаемым ваххабитами шариатским правом: «Шариатский суд заменил действие сомалийского традиционного закона хеер (на яз. сомали – «договор»). Однако этот радиальный шаг как раз не усилил, а, напротив, более всего подорвал позиции исламистов. Ведь хеер издавна определяет весь внутренний уклад сомалийского общества: полномочия совета старейшин клана, взаимоотношения с соседями, решение наиболее важных вопросов. Например, условия и размеры компенсаций, связанных с кровной мезью. В этих обсуждениях традиционно участвует всё взрослое население клана или общины. Что же до писаных законов и юридических норм и даже религиозных установлений (шариат), то для большинства они традиционно менее значимы, чем хеер» [11]. Для местного населения ваххабиты-исламисты быстро превратились из освободителей в революционеров, которые принесли порядок, не отвечающий традиционной структуре общества. Этот же сюжет повторился в Афганистане: талибы были героями до тех пор, пока защищали мирное население от банд, но затем большинство афганцев было шокировано публичными порками, уничтожением телевидения и прочими пуританскими мероприятиями. А поскольку Афганистан – страна меньшинств, далеко не все из которых исповедуют суннитский ислам, то талибы вошли в историю как истребители народностей-шиитов (хазарейцев) и вандалы, разрушившие множество произведений неисламского искусства (статуи Будды в Бамиане, фрески в Герате).

Возникает вопрос: могли ли при таком соотношении сил и обстоятельств исламисты-ваххабиты воздержаться от террористических методов борьбы? Думается, что нет. Опираясь на абсолютное меньшинство населения (Нигерия), противопоставляя себя традиционно ориентированному обществу (Афганистан, Сомали) они не могут навязать свою волю без утрашения. Их порядки не получают поддержки, а для силового диктата сектанты слишком малочисленны. Судьба улыбнулась им в Ираке, где и без сектантского вмешательства шла партизанская война, и в Сирии, где «Исламскому государству» удалось вмешаться в гражданскую войну между светским президентом и светской же оппозицией. Но и там они широко применяют утрашение и запугивание, потому что им в позитивном смысле совсем нечего предложить местному населению, выбирающим между традиционным исламом и прозападной модернизацией. Принять же традиционалистскую установку исламисты не могут, потому что с момента своего возникновения являются революционерами, ниспровергателями классического ислама, превратившегося, по их мнению, в «идолопоклонство». Объявляя ортодоксальным суннитам джихад, они поступают так же, как в начале XX в. поступали революционеры-социалисты, в разгар Первой мировой войны действовавшие против законных правительств. Как российские коммунисты не могли быть союзниками царя против немцев, так и исламисты не могут быть союзниками суннитов против западного культурного проникновения, которое в последние полвека очень беспокоит исламский мир. Проще говоря, воинствующие сектанты – не меньшие враги ортодоксальных мусульман, чем европейские колонизаторы или агенты глобализации.

Исходя из проведённого нами анализа сил, составляющих «международный терроризм», можно сделать вывод, в современном мире ведётся война не против всех государств и организаций, которые в той или иной форме применяют террористические методы, а только против радикальных исламистов, вдохновлённых ваххабитскими идеями. Более того, сражающиеся с исламистами войска сами применяют террор в его военной (например, бомбардировки афганского мирного населения) и государственной (например, пытки в тюрьме Абу-Граиб) формах. Но в данной ситуации этот террор является ответной и иногда необходимой мерой для того, чтобы остановить радикалов-сектантов. Тем более что революционный террор исламистов носит не оборонительный, а наступатель-

ный характер. Бесспорно, процессы глобализации сильно разбалансировали обстановку в дар аль-ислам, но вряд ли это служит оправданием для попыток вернуть весь мир в VII в. н.э., во времена пророка Мухаммеда.

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A Framework of Multimedia Integration Based on Teacher's Perspectives

ABSTRACT

Aims: Teacher's role in multimedia integration is not only a user but also a designer and producer, by which teachers can manipulate more appropriate multimedia aids and fulfill teacher's essential needs. In order for a teacher to promote the efficiency and effectiveness of the technology integration in classroom, this study explores the entire process of teacher designer to integrate multimedia materials and induce a framework based on teacher's position so as to help designers in their integration of multimedia materials.

Study Design: This study is based on the criterion of a qualitative approach.

Place and Duration of Study: Kindergartens in Taichung City, between May 2012 and February 2013.

Methodology: In total, ten kindergartens, twenty-five classrooms, and thirty-two qualified preschool teachers were involved in this study. The selection of the interviewees and the observation classrooms were based on recommendations by the school principals who were more familiar with their own situation in technology integration.

Results: In the end of this paper, we construct a framework of multimedia integration consisting of five main procedures to illustrate how teacher designers are to proceed their journey of integration. This framework provides a proper guide to teachers who want to integrate multimedia teaching aids in their classroom teaching.

Conclusion: Through the application of this model we expect that teachers can easily design the digital teaching aids which are fit for their real needs and allow teachers' teaching to be more efficient and effective.

Keywords: computer integration; teacher's perspective; multimedia; multimedia integration.

1. INTRODUCTION

The highly developing of computer technology allows multimedia information to be presented variously and vividly, and the speedy connection of internet allows people to gain information easily and swiftly. Thus, the application of multimedia technology in classroom is very pervasive and is integrated into different levels of education in classroom teaching. The definition of multimedia is a function of computer system which transmits visual and aural information to user interactively [1]. The idea of integration of multimedia in teaching is to connect different multimedia elements, such as text, image, audio, animation, and video, to create digital teaching materials and to apply it in classroom teaching, which intends to improve the quality of teachers' teaching and students' learning [2]. Many researchers claimed that applying multimedia materials can create many positive effects in classroom teaching. For example, there are researchers indicating that the integration of computer technology helps teachers to build a more visualized and more interactive learning environment in their classroom teaching [3]. Researchers also alerted that various products of computer technology are very powerful teaching tool adopted to achieve powerful interactive teaching, which increases learner's interest and help them to engage intensely in their learning objects [2,4]. Many researches also indicated that the application of computer technology has great potential to increase students' motivation, help learners to connect various information sources, provide opportunities to work collaboratively, and allow teachers to have more time for facilitation in classroom [5,6,7]. As [8] declared, one of the advantages of integrating multimedia is that it allows students to assess the teaching content easily and helps them learn to be more effective.

However, some researchers declared that digital media materials have no direct effect on students' learning achievement [9,10]. According to [11] theory of cognitive load, he declared that human's learning in brain is just like a data processing machine, and the learning achievement is based on how people process and arrange the information. Based on this theory, [12] developed multimedia cognitive learning theory and advocated theories of how multimedia elements influence student's learning effect. They declared that too many multimedia materials or inappropriate arrangement in teaching may cause negative influence on student's learning achievement [13].

Therefore, the integration of multimedia in teaching does not simply focus on how many digital materials are involved in the curriculum but how proper the materials are used. The volume of using multimedia is not the main concern. What we really need to focus on is how to utilize this strong tool to create positive effect in teaching and learning [14,15].

In order to promote the efficiency and effectiveness of the technology integration in classroom, numerous frameworks are constructed to help teachers to involve computer technology in curriculum ably and efficiently [16,17,15]. However, researchers and educators indicated that integrating computer technology into curriculums has not been accomplished well yet. Researchers indicated that teachers have not really integrated digital technology into their classroom teaching but only into their personal documentary work. These developed frameworks or models are too theoretical and idealistic in reality [15] and do not consider the angle of teacher user and teacher designer normally [18]. Even if teachers can understand some principles, design concepts, and standards, they often forgo these principles and frameworks in actual teaching implementation. Therefore, researchers suggest that digital technology integration must take into account of teachers' specific habits of applying technology [19,20,21].

Furthermore, due to the heavy load of teachers' daily routine work, teachers used to adopt the published multimedia materials for assisting their teaching, such as instructional CD-ROM, DVD, or internet platform. However, these published digital materials do not fit teachers' essential needs normally. Teachers only can adopt only limited useful parts of the published materials and strive to reorganize the content. Therefore, the current packages of digital teaching aid do exist with a great gap between teacher's actual need in teaching. On the other hand, it is quite time-consuming for teachers to find appropriate multimedia teaching aids. These have brought tremendous obstacles for teachers in multimedia integration.

To solve these problems, teacher's role should be transformed from user to both designer and creator. Due to the pervasive use of computer technology, teacher's competency of using computer technology has been improved tremendously, and increasing numbers of teachers can operate and design multi-media materials. If teachers can arrange and produce multimedia teaching aids by themselves, the integration of multimedia in classroom teaching will be more effective

and efficient and close to teachers' actual needs. However, from being a user of digital material to being a designer does exist a gap and prove long way to go. For this reason, this study tends to explore the entire process of how teacher designer integrates multimedia materials in classroom teaching and to induce a framework based on teacher's position to help his/her integrating multimedia in their teaching. Therefore, the research question of this study is to investigate what a teacher may experience in the entire process of integration and to clarify various kinds of consideration, difficulty, possible problems, and solution which a teacher designer may meet in his/her integration.

2. MATERIALS AND METHODS

The research method in this study was based on the criterion of a qualitative approach. Teachers' views of how they integrate computer technology and the entire process of how they integrate multimedia material were investigated. Both approaches of in-depth interviews with teachers and observations of the real classroom teaching were adopted. A semi-structured interview technique was adopted as our research interview method was due to the main topics being fixed, although the sequence of our interview question was not necessarily the same for all interviewees, as shown in appendix. All interviews were audio-recorded and the transcriptions were completed on the same day. The classroom observation was implemented with note taking and video recording concurrently by the researcher.

Instead of random sampling, purposive sampling was adopted in this investigation [22,23]. Through contacting and visiting numerous kindergartens which are well known for integrating multimedia materials in their curriculum in Taichung City in the middle of Taiwan, researchers selected the research participants who were more willing and appropriate for this study. In total, ten kindergartens, twenty-five classrooms, and thirty-two qualified preschool teachers were involved in this study. The selection of the interviewees and the observation classrooms were based on recommendations by the school principals who were more familiar with their own situation in technology integration. The period of each classroom observation was at least five days and was supplemented by referring to the teacher's lesson plans. The number of participants was decided by saturation of the researched data, that is, when the informants could raise no more new issues and start to repeat the same

issues as compared with previous interviewees or classroom observation, it may be valueless to collect more data.

Through a series of qualitative analysis steps, the researcher analyzed the collected data systematically from the raw data corpora, generated codes, and built some initial low level concepts; thus gradually we developed some more abstract themes, and then substantive theories were constructed in the final stage [24]. The qualitative analysis of the data helped us to refine and deduce how kindergarten teachers integrate computer technology into classroom teaching, and how they apply multimedia materials to designing digital teaching aids for classroom teaching. These results provided the researcher with various themes and codes to help constructing a substantial model for teachers in their integration of multimedia.

3. RESULT AND DISCUSSION

This study is based on the empirical investigation of teacher's actual use of multimedia in their classroom teaching. This research deeply looks into teacher's considerations, challenges, and struggles when they integrate multimedia into their classroom teaching. The process of designing and making digital multimedia materials was also explored. Through the inductive analysis of the qualitative data, the researcher concludes a framework with 5 procedures for teachers in their integration of multimedia, as shown in Table 1. The sequent procedures are: preparation and analysis, plan and design, detail manufacture, test and modification, implementation and reflection. Every procedure has consideration in detail. The sequence of the identified procedures has a logic connection with the former and latter procedures. These identified stages start from the macroscopic self-analysis to the intermediate arrangement, to the microcosmic practical manufacture, and back to the amendment, and finally to the macroscopic amendment and reflection from user and learner.

Table 1. Significant factors emerge from the analysis

Identify category	
Preparation and analysis	Internal self-analysis (teacher's perspective and attitude of adopting multimedia in teaching, teacher's confidence and competency of using multimedia, and teacher's will of using computer technology)
	Evaluation of external environments (school ideology and policy, school equipment of computer software and hardware, support from school manager, technique aid and consultation, and peer review and support).

Plan and design	Design teaching objective Lesson planning Design teaching activities Searching available multimedia resources
Detail manufacture	Making interface for teacher user Making interface for student user Expression of the contents
Test and modification	Implementation and reflection Confirm whether it has defect or gap Amend inaccuracies to be proper Using the digital aids in the classroom teaching Clarifying the feedbacks and suggestions Significant points in the procedure of reflection.

3.1 Preparation and Analysis

In the first stage of the procedure, the researcher concludes that teachers have to do self-evaluation including teacher's internal factors and external factors from teacher's environmental reason. This stage strongly influences whether teachers will actively or passively integrate multimedia into their classroom teaching. If teachers' perspectives of using multimedia in this stage are pessimistic, they tend to decide not to use multimedia as their teaching materials. This stage is much closer to teachers' self-analysis of their motivation of adopting or using multimedia. The influenced factors can be divided into two parts: the internal self-analysis and the evaluation of external environments. The former includes teachers' perspective and attitude of adopting multimedia in teaching, teachers' confidence and competency of using multimedia, teachers' will or motivation to spend time and effort on it. One teacher with a positive perspective declared that:

In fact, I am very interested in multimedia stuffs. When we turn on the computer, it is full of multimedia information. These are very useful materials, and I believe it can bring very positive effect in classroom teaching. According to my observations, students seem to have very good responses to multimedia teaching aids. Personally I am very willing to use or make multimedia teaching materials (T16).

The other teacher with a negative opinion declared that:

I think young children should reduce the stimulations from digital multimedia. They are surrounded by different kinds of digital materials and overused them. I feel it is too early for them to contact digital materials and so on. Habitually I don't use digital multimedia in my classroom teaching because I don't think it can bring any help in my teaching and students' learning (T6).

Furthermore, many teachers believed that their computer competencies were not sufficient and lacked of knowledge and experiences of using digital multimedia so that they might feel anxious for using multimedia. The other consideration was the time consuming. Many teachers claimed that to adopt multimedia materials needs to spend more time in organizing and editing digital materials. To sum up, the above considerations, many teachers do tend to give up using multimedia in their classroom. One of the teachers commented that:

At the time when we were students, multimedia technologies did not exist yet. These new stuffs are what only the young generation can use. To be honest, we cannot use them at all except the easy one, for example, PowerPoint. Our working load in everyday's routine work is already very heavy. To spend more time learning and making multimedia materials for classroom use is not practical and realistic (T14).

Thus, teachers have to experience this internal self-evaluation procedure in the initial stage. They have to overcome their negative perspectives to multimedia and increase their willingness to use it in their curriculum. As researchers have reported, a teacher's computer attitude or computer self-efficacy will decide whether the teacher will adopt computer technology in the teaching [25,26,27,28].

Except teacher's internal factor, there are still many essential external factors which may affect teacher's use of multimedia and which need to be analyzed and examined in the initial stage. Through the analysis of teachers' perspectives in this point, the researcher concluded five external factors which might influence teachers' decision of applying multimedia materials. Those are support from school ideology and policy, school equipment of computer software and hardware, support from school manager (principal or director), technique aid and consultation, and peer review and support. Teachers advocated that once these external factors are supported, they may willingly integrate multimedia into their classroom teaching.

In my school, the policy is to encourage teachers to use and make multimedia materials. The principal has proposed this idea a lot. She thinks it is a future tendency to be digitalized for teaching. Every Wednesday's routine meeting she arranged some teachers who often used multimedia for teaching to teach and share how they have worked in integrating multimedia. I think the equipment for using digital multimedia in my classroom is quite sufficient. Each classroom has a computer and a projector. ...Actually I will not use multimedia materials in my teaching if our school doesn't

support these essential facilitators. Due to the request and advocacy from the school supervisor, we have no option but just follow this order without hesitation to integrate multimedia in teaching (T21).

I think the implementation of adopting multimedia for teachers' classroom teaching was mainly influenced by the school adviser or principal's recognition and advocacy. Teachers normally will not do this work actively. In fact, they are required by their supervisor to use it; for example, teachers are asked to make student's digital portfolio. Every student will have one CD or DVD disk with multimedia elements on it. They have no choice but just have to complete this job (T18).

Researchers claimed that school leader has great influence on teacher's use of computer technology [29]. Researchers also alerted that school-related policies, equipment support, and teacher professional training of multimedia technology have played an essential role for teachers to integrate multimedia in their classroom teaching [30]. Their research also reveals that school policies are often under-developed and underutilized in developing teacher's use of technology in classroom.

Therefore, to be a multimedia user and designer, teachers have to implement self-analysis of their perspective and confidence of applying multimedia in teaching and extinguish whether their external environment has sufficient support. If these considerations were not to reach certain level, teachers might not go forward to the next procedure of integration. If teachers are lack of confidence in involving new technology for teaching after the above considerations, most of the teachers may decide to neglect or abandon this new tool [14].

3.2 Plan and Design

When a teacher's internal and external motivation are satisfied, the teacher designer may have the motive force to move on further. Once teachers have entered the process of planning and designing, there are several points which the researcher has concluded need to be considered carefully. This stage focuses on the design of the whole integrative picture or plan which includes decision of learning objective, arrangement of curriculum and pedagogy, selection of multimedia resource, and methods of integrating into teaching activities. Teachers in this stage need, firstly, to decide their teaching objective, do lesson plan, and design teaching activities which can reach their teaching goals. Secondly, they have to think about what or which

multimedia resources are available, what teacher's ability of editing multimedia is, which activities need to involve multimedia, what place in the activity should involve multimedia, and how to deposit. One of the respondents claimed:

The most difficult part of integration of multimedia for me is how to design and involve multimedia in curriculum and teaching activities. It means I have to decide which place, what kind of, and how to use multimedia in teaching.... On the other hand, we have to consider its essentiality. We use it because we do need it, and we expect it to create good influence on our teaching and students' learning (T2).

As researchers have advocated, the role of using technology is to be an effective and efficient tool but not to be a purpose [31]. [15] coincided that designer has to justify why the use of multimedia is essential, what value or advantage it will create, and how it can support classroom teaching. Thus how to plan and arrange multimedia to be a useful and effective teaching tool is the main task for teacher designers to consider and think carefully in this procedure.

3.3 Detail Manufacture

After teachers have planned the method and strategy to integrate multimedia in curriculum, the next step is to make the idea materialized. In this procedure there are three dimensions which need to be concerned by designers: teacher user, student learner, and expression of the multimedia content. Firstly, we have to consider whether it can be easily operated by user and whether the interface of operation should be too complicated. The inconvenient and complex interface used may cause problems for teachers to their operating. This discontinues teachers' teaching flow and disturbs students' concentration of learning. As what [22] have emphasized in the usability of the technology, the designed digital material has to be operated easily. Even though the content is plentiful and attractive to learner without convenience and ease for user to use, the tool still cannot reach its expected achievement. One of the participants claimed that:

What we hate most in teaching with multimedia is the complicated operation procedure, unfriendly operational interface, or unsolvable technical problems for teachers. For example, when we have to play a video file, we may need to try different driver or need to install new software. To deal with these operative problems causes interruption of my teaching and break student's concentration on learning. Sometimes

the problems may not be solved instantly, teachers are forced to quit the lesson and substitute with other activities (T11).

Thus, a teacher who wants to be a designer has to consider several essential elements in the views of user when they are making digital teaching materials, such as whether it can be operated easily by user, is it too complicated, have we selected the proper computer software, and so on.

Furthermore, a designer also has to conceive the angle of learner including their age, studying grade, learning style, and cognition level, and so forth. For example, the ability of preschool students to recognize abstract script is not sufficient. They need to use more graphic, image, or animation to facilitate their comprehension of the information. In this case, teacher designers can reduce the part of script illustration and add some more digital materials with cartoon characters, which can activate learners' learning motivation and interest. However, some teachers indicated that using too many multimedia materials may cause opposite influence to student's learning effect and efficiency. Designers also have to consider learner's limit in the volume of learning content and time of concentration. One of the teachers has commented that:

As we can usually observe when we play video program or cartoon for students to watch. In the first minutes they are so attracted by the program. Once it is longer than 10 minutes, some students start to lose their concentration, talk to their neighbor, turn their head and look around, or leave their site... Although these digital materials are very attractive to them, we can see that it doesn't always work and needs to be arranged properly (T28).

This point coincides with [13] explanation in the theory of cognitive load. Based on the idea of cognitive load, human being's learning is limited, and too much information and stimulation in the teaching may cause increase of student's cognitive load, which may reduce learner's learning effect and efficiency. Due to the consideration of learner's nature of learning, teachers can avoid the mistake of inappropriate use of multimedia and bring more positive effect to students' learning [32].

Beside, in this stage whether the multimedia has presented the teaching content properly need to be thought carefully. When designers have transformed or manipulated the teaching content into the multimedia materials, they have to check the

completed work to see whether it has missed or deviated from the main teaching stream. As one of the participants' comment has said:

We may choose many digital teaching aids or materials to help our teaching. However, on many occasions, the chosen materials have limited components related to our teaching objectives which can be adopted for actual teaching. Teachers used to put all the materials into their teaching even though these are very slightly related to their teaching objective. Sometimes the published digital materials may contain various subjects. When teachers use it in the unrelated topic, students may lose their focuses easily. Therefore, it is a very essential issue for teachers to spend more time to filter the right materials for their teaching use (T1).

Furthermore, in this stage designers have to consider whether their designed multimedia aids have involved the function of interactivity. The interactivity in multimedia teaching has been emphasized by many researchers [33,29,34]. The interaction of multimedia can be classified into four types: learner-instructor, learner-content, learner-interface, and learner-learner [35]. In this stage the researcher emphasizes the interactivity between instructor-content. Except teacher's teaching pedagogy has to be interactive, the interactivity between teacher and multimedia plays an essential role in facilitating teacher to teach interactively. One teacher commented that:

Traditionally, the idea of multimedia integration is alone to play video or animation with CD-ROM driver and have very little interactivity between the teacher and the students. Nowadays, the technology of multimedia has been developed swiftly and can allow designer to develop the interactive function for user to operate. For example, on the operational interface, it increases the controlling function, such as pre-page, next-page, pause, back to the main menu, hyperlink click, etc. These interactive controlling functions allow teachers to operate more fluently and create more opportunities for them to teach interactively (T22).

Moreover, the expression of multimedia teaching aids usually consists of several multimedia elements [2], such as the electric picture book involves still images and words, and the animation of picture book involves the element of words, images, animations, and auditory effects. Thus, in this stage teacher designers have to decide what multimedia elements are appropriate to be applied in their work, and they also

need to choose what multimedia software is more convenient to be operating and can create the best effect.

3.4 Test and Modification

When the first edition of the multimedia is completed, we will go to the next stage of check and modification. Before we start to use the completed work of multimedia teaching aids, it is very essential for us to confirm whether it has defect or gap and to amend those inaccuracies to be proper. As one teacher has mentioned:

According to my personal experience, when we check the first edition of the completed digital work, we usually find some gaps or defects in the original design and this may be far from our initial expectation. This is because the problems or difficulties appear only when we are dealing with the details. Therefore, it is very necessary to go back to the original idea, check the present work, and then do the proper modification (T26).

In this stage, teacher designers usually need to go back to the second and third procedure of the entire process to investigate all the details about whether the designed multimedia has fulfilled our teaching needs. These may include whether the content of the multimedia can reach the teaching objectives, the digital materials are convenient and easy to be used, the expression of multimedia materials are artistic and can create student's learning interests, and the arrangement of the sequence and time are suitable and allows learner to obtain the best learning effect. This process can be completed through peer review, by which teachers or school supervisors estimate and conceive what possible results may be caused, what aim the multimedia may reach, and then what modification may be done. Once they discover the fault, the designer may need to go back to the second procedure to reorganize or the third procedure to remake until the final check has been completed in this procedure, and then we can apply it practically in actual teaching in the next step.

3.5 Implementation and Reflection

When the former process of modification has been completed, the next step is to implement. The completed multimedia aid was used to the classroom teaching practically, and the feedbacks from teachers and students will be collected in this

stage as well. The feedbacks from teacher's teaching, student's learning, and peer review have to come back to the designer. Through clarifying the feedbacks and suggestions, teacher designers can inspect their work and accumulate more experiences of multimedia integration. This process of reflection not only can help designers to correct the defect at this time but also help to avoid making the same mistake in the future integration. It also offers an example for other teacher designers to refer. One teacher commented that:

When I was using multimedia to help my teaching, I could always uncover what was missing, what was lacking, and what was not proper. Through few times of experience of integration, I improved a lot and have less confusion and obstacle now.... Our colleagues do learn from each other. In Wednesday afternoon we have a routine meeting. We used to share our work with using multimedia to other teachers and check others' work, too. We got the experiences and suggestions from colleagues' checking and reflection (T9).

The reflection may consist of various aspects: school policy, teacher's individual motivation to the practical design, detail manufacture, and the implementation in the classroom teaching. The following list concludes the significant points in the procedure of reflection, which contains the aspects of multimedia factors, pedagogies, teaching objectives, and facilitation from school.

- Whether the software and hardware equipment or facilitation are sufficient?
- Have the school policy or school supervisor supported adequately?
- Whether the teaching activities with multimedia aids can help to achieve the teaching objectives?
- Whether the multimedia technology can effectively assist the process of activity teaching?
- Whether we have better substitution to replace the present way of using multimedia in teaching activity?
- Whether the application of multimedia material has been arranged properly so that it helps students to achieve the best learning effect?
- How to construct the multimedia teaching aid efficiently, usably, and artistically?
- Whether the designed or used multimedia materials are fit for the learner's learning character?

3.6 A Model of Integrating Multimedia in Classroom

Based on the above analysis and discussion, a model of multimedia integration can be constructed based on the views of teacher designers and the process they have to go through, as shown in Fig. 1. The model consists of five main procedures and links up a dual funnel form to unfold and connect their relations in the process of multimedia integration. This model illustrates how a teacher designer proceed his or her journey of integration from the mactureand then comeback to the macroscopic view of modification and reflection.

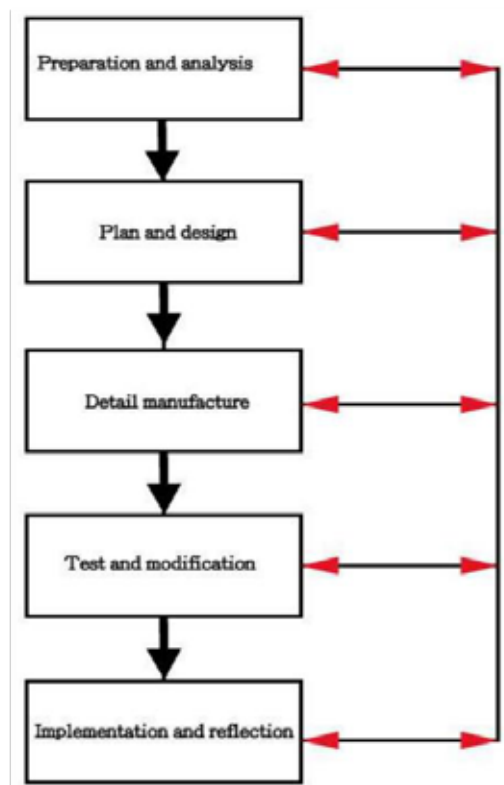


Fig. 1. A model of integrating multimedia

In the initial stage, teacher designers need to do the superficial self-analysis in some aspects and to do the initial preparation for their decision of multimedia integration. The self-analysis includes teacher's subjective perspective and will of using multimedia and the objective evaluation of the environmental support. The result of the self-analysis in this stage may influence teachers' motivation of continuing to apply multimedia materials in their teaching. When they have experienced the macroscopic analysis stage, they enter into the plan and design procedure. In this stage, designers narrow down their vision to the curriculum arrangement and

strategies of integration, and they have to plan where, how, and what the multimedia can be involved in the teaching activities. The followed procedure is to go into the process of detail production. Teacher designers have to focus on doing every single multimedia component, which needs to consider various points of view from the user and learner so that the way of multimedia content can be expressed. Once the digital multimedia is completed, it still needs to be tested and modified. In this stage, teacher designers need to pull their views back to the higher stance, examine whether the completed multimedia aids are proper to be used, and then adapt it again. When the modified multimedia teaching aids are first implemented in the classroom teaching by teachers, these aids may not be used perfectly at this stage. User, learner, and teacher designer may reflect some deficiencies or suggestions. Therefore, designers need to push themselves to a deeper and broader viewing angle and conceive every procedure of the multimedia integration carefully. Through this reflection procedure teacher designers can find out the apt way to improve their integration and accumulate more experiences to help their next multimedia integration to be more effective and efficient. Every procedure in the model is reversible, which can go back to the previous stage to do examination and modification.

4. CONCLUSION

Technology integration in classroom teaching has been a trend, which is not possible to be reversed [16,17,36]. However, the present published multimedia materials are difficult for fulfilling individual teacher's needs, so teachers cannot always rely on the existed baggage of digital materials. Teacher's role in multimedia integration is not only a user but also a designer and producer, by which teachers can manipulate more appropriate multimedia aids and fulfill teachers' essential needs. Only few models of integrating multimedia or computer technology are based on the stance of teacher and on the analysis of the integrating process. In this paper, the researcher constructs a framework of multimedia integration based on teacher designer's perspectives of designing multimedia teaching aids and the integration of digital teaching materials in teaching. This model describes an entire process of how teacher designers construct an integration of multimedia in their teaching. This model also provides a proper guide to teachers who want to integrate multimedia teaching aids into their classroom. Through the application of this model, the researcher

expects that teachers can easily design the digital teaching aids which are fit for their real needs and allow teachers' teaching to be more efficient and effective.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX
Questions of Semi-Structure Interview

1. What is your perspective of using multimedia technology in classroom teaching?
2. What are your considerations before you decide to involve multimedia technology in your teaching?
3. Could you please tell us what challenges and obstacles you may have to face when you integrate multimedia technology into classroom teaching?
4. Could you please share with us how you manage and arrange multimedia technology in your classroom teaching?
5. Could you tell us what the main concerns are when you are making multimedia teaching aids?
6. What are the students' responses after your teaching with multimedia technology?
7. What is the reflection of your integration of multimedia technology in classroom teaching?

Mathematics, Technologies & Engineering

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Novel Data Mining Techniques for Incomplete Clinical Data in Diabetes Management

ABSTRACT

An important part of health care involves upkeep and interpretation of medical databases containing patient records for clinical decision making, diagnosis and follow-up treatment. Missing clinical entries make it difficult to apply data mining algorithms for clinical decision support. This study demonstrates that higher predictive accuracy is possible using conventional data mining algorithms if missing values are dealt with appropriately. We propose a novel algorithm using a convolution of sub-problems to stage a super problem, where classes are defined by *Cartesian Product* of class values of the underlying problems, and *Incomplete Information Dismissal* and *Data Completion* techniques are applied for reducing features and imputing missing values. Predictive accuracies using Decision Branch, Nearest Neighborhood and Naive Bayesian classifiers were compared to predict diabetes, cardiovascular disease and hypertension. Data is derived from Diabetes Screening Complications Research Initiative (DiScRi) conducted at a regional Australian university involving more than 2400 patient records with more than one hundred clinical risk factors (attributes). The results show substantial improvements in the accuracy achieved with each classifier for an effective diagnosis of diabetes, cardiovascular disease and hypertension as compared to those achieved without substituting missing values. The gain in improvement is 7% for diabetes, 21% for cardiovascular disease and 24% for hypertension, and our integrated novel approach has resulted in more than 90% accuracy

for the diagnosis of any of the three conditions. This work advances data mining research towards achieving an integrated and holistic management of diabetes.

Keywords: data mining; missing value imputation; diabetes management; classifiers; diagnosis accuracy.

1. INTRODUCTION

There has been a growing interest in understanding the applications of data mining for clinical decision support in metabolic syndrome and diabetes mellitus type 2 due to its clinical complexity and its association with an increasing risk for heart disease and stroke, and hypertension [1-3]. Many studies have consistently reported suboptimal diabetes control outcomes despite improvements in clinical information and self-management support systems that have been recently established [4-9]. This is in part due to missing clinical data which reduces the information content for accurate decision making. The rationale of the study is that, given appropriate algorithms for imputing missing values, the accuracy of diagnosis based on clinical data should improve. The prime objective of this study is to propose novel imputation techniques in data mining to improve the predictive accuracy of diabetes, hypertension and cardiovascular disease (CVD) from clinical data.

A naive approach to dealing with a record having one attribute value missing involves deleting the entire record. However, the removal of records may leave too few examples covering specialized subsets of data and compromises the analytics. Another approach involves restructuring the dataset into smaller sets, where each new set has minimal missing values [10]. However, the decomposition of the data mining task into a series of smaller interconnected tasks can impose a structure that reduces the associations that can be discovered across all attributes. An alternative is to substitute the missing values with imputed values. Experts familiar with diabetes can conceivably impute missing values manually but this is rarely practical for assembling a large diabetes dataset as the amount of missing data may be extensive and the method is subjective and therefore not repeatable.

Common approaches to imputation involve filling in missing values with the mean values of corresponding attributes. This is computationally easy to apply but can compromise generalisation because the record with the missing values may not be representative of all records. However, if the mean is calculated solely from those records that have the same class value as the record with the missing value, predictive accuracy can be expected to increase.

The approach presented in this study involves two strategies we call *Incomplete Information Dismissal* and *Contextual Data Completion by Mode*. *Incomplete Information Dismissal* involves eliminating features and records that do not contribute to a classification. This involves a formally specified feature ranking algorithm. In [11], each class is considered as a cluster of data points in the problem space. The cluster centre represents a signature for the class. A new instance is classified by selecting the cluster centre closest to the point representing the new instance. The least important features for a class are those that cause data points to be closer to centres of other classes. With nominal/discrete data, it is more convenient to use feature ranking based on association measures, particularly Information Gain (IG). However, the approach described in [11] is conceptually the same.

The *Data Completion* involves the imputation of missing values. In this approach, a set of points closest to the missing value point are selected, so that the class was the same. Each possible replacement value is evaluated to identify the replacement that will make the missing value instance closest to the others. This approach is dependent on other missing values, so the algorithm iterates through successive imputations. Other approaches to missing value imputation involve use of a classification algorithm where the data set is prepared so that the class is the attribute with the missing value. A classification algorithm such as a decision tree induction exemplified by C4.5 is trained using records with known values and run to predict the attribute's missing value. Imputation using classification algorithms in this way is computationally expensive because a model for each attribute must be trained. Values imputed by our algorithm involving the *Data Completion* approach are finely tuned to more likely lead to high predictive accuracies when the dataset completed with imputed values is used for classification. In addition, we propose a novel integrated approach where the classes are defined by *Cartesian Product* of class values for underlying problems, namely diabetes, cardiovascular disease (CVD) and hypertension so as to set up a super problem that would classify diabetes, CVD and hypertension at the same time - a step toward a holistic management of diabetes.

Some diabetic prediction studies conducted recently [12] have achieved good classification accuracies with a weighted sum approach compared to other data mining models such as logistic regression and neural networks. However, the highest accuracy level achieved to predict diabetes or prediabetes was only 77.87% based solely on traditional risk factors and results are not presented in a clinical useful way.

This paper reports that common data mining algorithms can demonstrate higher accuracies for classification of diabetes, CVD and hypertension if incomplete clinical data is managed appropriately by including a two-stage approach of *Incomplete Information Dismissal* and *Data Completion* with convolution (*Cartesian Product*) of class values of the three problems.

1.1 Background

Diabetes Mellitus (DM) is a metabolic disorder of multiple etiology. It is characterized by chronic hyperglycemia and disturbances of carbohydrate, fat, and protein metabolism resulting from defects of insulin secretion, insulin action, or a combination of both [7-8,13]. The most common types of diabetes are type 1 diabetes (insulin sensitive due to cellular-mediated autoimmune destruction of the β -cells of the pancreas in 90% of cases and is idiopathic in 10% of cases), and type 2 diabetes (insulin insensitive due to pancreatic β -cell dysfunction and insulin resistance) [14]. Uncontrolled diabetes leads to a risk of microvascular (retino-, nephro- and neuropathy) and macrovascular (cardio-, cerebrovascular and peripheral vascular) health problems. Diabetes is increasingly reported as a primary cause of death, and the risk of death for people with diabetes is twice as high as for the general population with similar age [15].

While many clinical tests consider various standard factors such as age, blood pressure (BP), age at clinical onset, body weight, family history, urinary blood sugar levels and ketones, there is much more investigation required into how traditional and emerging biomarkers combine for optimal control of diabetes [16,17]. As clinical tests become more sophisticated, there is a huge amount of data collected from each patient on various attributing factors including inflammatory, oxidative stress and genetic biomarkers that need to be integrated into a comprehensive clinical decision making model. However, analysis may be hampered or may not give the correct results when information is missing.

The way a data mining algorithm presents results for interpretation by an analyst depends, to a large extent, on the algorithm. The ID3 classifier described by [18] generates a decision tree where nodes are attributes, arcs represent possible values, and leaf nodes represent data to be classified, as illustrated in Fig. 1. Decision trees can readily be understood by clinicians, however decision trees generated from many variables are typically very large and cannot easily be interpreted [19]. Fig. 2

depicts the weighted sum visualization (AWSum) output [20]. The horizontal bars depict the influence a pair of features has on a classification of diabetes on the right side of Fig. 2 compared with one of no-diabetes on the left side. A clinician can readily ascertain that the propensity toward diabetes for females with a cardiovascular risk of 15-20% is quite high despite gender and CVD risk category not contributing on their own to this conclusion.

Although data mining algorithms that present data visually in ways that enhance insight, as exemplified by Figs. 1 and 2, are emerging, their usefulness is limited by the extent to which missing values impede the classification.

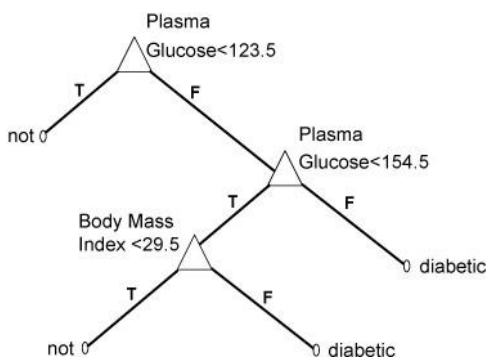


Fig. 1. Conventional decision tree

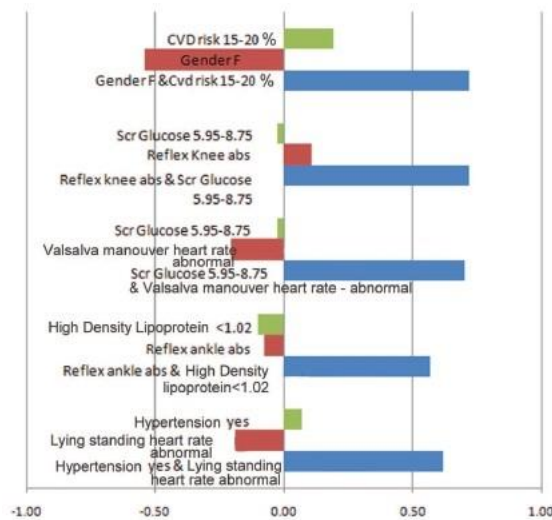


Fig. 2. Weighted sum visualization

1.2 Missing Value Imputation Techniques

Most techniques for the imputation of missing values treat numerical and categorical attributes differently, so the same technique cannot be used when both numerical and categorical features are present. A review of the imputation of numerical values including techniques based on the Nearest Neighbor approach, Linear Interpolation, Cubic Spline Interpolation and Neural Networks is provided by [21,22]. In general, these approaches use the numerical values in a distance function that represents the degree of similarity between records. In [23,24], approaches based on modeling of a data probability density function using kernels such as Gaussian were evaluated, allowing the relationship between attributes to be exploited. In this connection, [25] discusses the Expectation Maximization algorithm (EM) introduced by the authors

of [26], which relies on the data mean and covariance matrix. Generally, a model of data can be fit to a sample. Many statistical software packages (SPSS, SAS, to name a few) implement derivatives of EM and the alternative technique of Multiple Imputation (MI) from the authors of [26]. A review of MV imputation methods in classification is also given in [27]. A more recent missing value imputation technique using an entropy based decision tree algorithm provides better results for datasets having higher correlations among attributes [28]. However, attributes in medical datasets may not necessarily be highly correlated and these methods are therefore still not optimal.

In dealing with incomplete medical data, some researchers have attempted to use missing value imputation with general practice data [29-31], and longitudinal dietary data [32,33]. However, pitfalls in adopting a single technique have been reported by [34]. In [35], less than forty studies that had applied data mining techniques to diabetes were found in a recent systematic review of the literature. The relative paucity of studies can be explained by noting that the performance of an effective data mining study in diabetes requires the assembly of an appropriate dataset, comprehensive approaches for preparing the data for mining from both discrete and continuous data, and presentation of results in a manner that can be meaningfully understood by diabetes analysts.

As clinical tests become more sophisticated and numerous, there is a huge amount of data collected from each patient on various attributing factors. Virtually all patient datasets are replete with missing values for various reasons: equipment used for measurements sometimes malfunctions; a value could be missing because data was never collected – eg HbA1c test was never obtained or the patient was unable to complete the test. In other situations, the value was simply not available at the time of collection but may have become available subsequent to the assembly of the dataset.

This paper addresses the issues of missing values (MV) in clinical data sets, and as a first step proposes novel data mining techniques to deal with, and impute missing values to provide an improved and reliable diagnosis and management of diabetes.

2. MATERIALS AND METHODS

In this section, we describe how clinical datasets were collected and organized, and the proposed methods adopted for the experimental study. We provide below

details of how our approach discretizes continuous variables to nominal values and deals with missing values MVs using 3 classifiers: Decision Tree (DT), Nearest Neighbor (NN) and Naive Bayesian (NB).

2.1 Clinical Datasets

The dataset used in this study is derived from the Diabetes Screening Complications Research Initiative (DiScRi) conducted at a regional Australian university [36]. It is a diabetes complications screening program in Australia where members of the general public participate in a comprehensive health review. The DiScRi community screening concentrates on diabetes, cardiovascular disease and hypertension as a triad of diseases. There are no explicit groupings for retinopathy and neuropathy provided in the database and therefore these were not considered in the current investigation. The screening clinic has been collecting data over ten years and includes over one hundred features such as demographics, socio-economic variables, education background and clinical variables. Clinical variables included blood glucose level, HbA1c, cholesterol profile, inflammatory and oxidative stress markers, other medical history, body mass index, peripheral vascular function, and ECG derived variables. Data on 273 attributes from approximately 2500 attendances of nearly 900 patients have been collected in recent years. The dataset has been used in several data mining applications [37-39]. Application of the Data-driven Decision Guidance Management System (DD-DGMS) approach to this dataset is discussed in the following subsections. Currently, the project is still continuing to collect data, and therefore the dataset is not yet made public until completion of the project.

The database of 2429 records underwent compression to instantiate patients instead of attendances. The latest data in chronological order was used to initialize patient records. Any MVs in 102 applicable attributes were sourced from previous attendances leading to approximately one-fourth of MVs being restored. Altogether, the 824 instances included patients not diagnosed with diabetes mellitus of any type (594), those diagnosed with T2DM (211) and T1DM (19). Type 1 instances were later excluded as the feature-set was not discriminating T1DM enough from control and T2DM, and due to the small T1DM sample. Fig. 3 provides a typical dataset snapshot of the attributing factors collected from the clinical trials of patients diagnosed with diabetes, cardiovascular disease and hypertension. The database includes patients'

demographic information that form pre-determined data along with the main clinical data as well as derived data.

The diabetes dataset assembled for this study contained 97 attributes, of which 65% were incomplete, and 805 instances, of which none was complete, with 32% values missing across all data, as appears in Table 1. The class structure for the current classification problem is shown in Table 2. For example in row one, Type II Diabetes is the diagnostic class (Class 1), anything else is in Class 0.

In this work, with many nominal attributes in the data, we adopt an approach based on continuous attributes discretized.

2.1.1 Even frequency discretization

We discretize any continuous attribute using an algorithm we call *Even Frequency Discretization*, so methods that work with all-nominal data could be applied. The technique is an interpretation of the Fixed Frequency method [40]. Real-valued data is distributed into intervals to accumulate frequencies of corresponding discrete values. The frequencies are targeted to be as even as possible. Due to the limited precision in obtaining data, a value, even though perceived as unique, may repeat. The number of intervals is same for all attributes discretized. The adopted approach has proved being reliable in many applications.

Table 1. Diabetes dataset

All	Attributes		Instances		Values
	Numerical	Incomplete (%)		Incomplete	Missing
97	56	65	805	100	32

Table 2. Data subdivision by class

Problem	Classes (%)		
	Unknown	0	1
Diabetes mellitus	0	74	26
Cardiovascular disease	28	54	18
Hypertension	20	32	48

'Unknown' – instances not having class attribute set; *'0'* – control class; *'1'* – diagnostic class

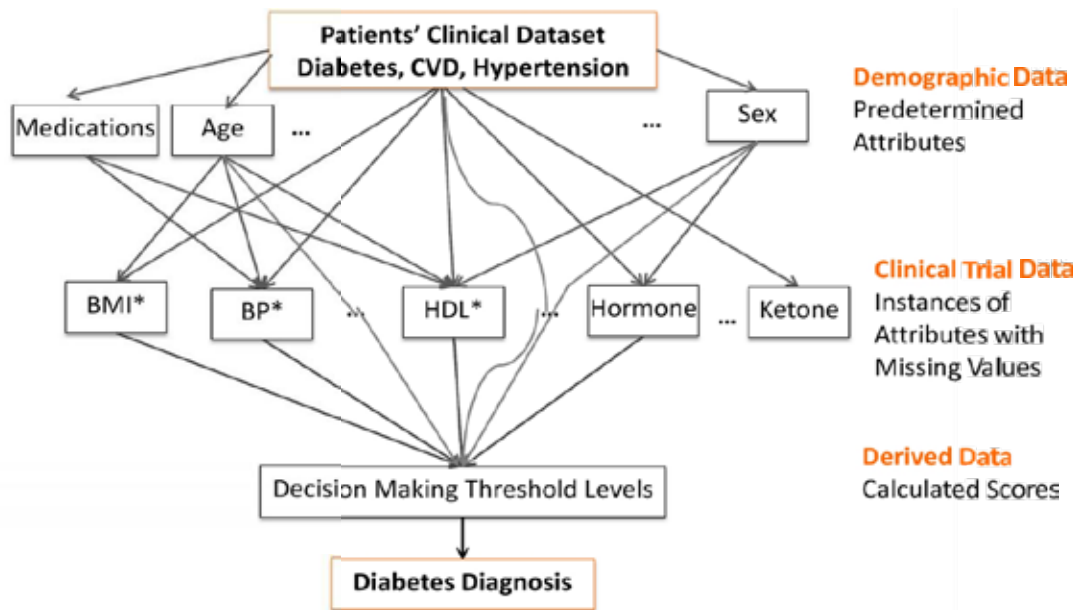


Fig. 3. Typical clinical dataset model

**BMI-Body Mass Index; BP-Blood Pressure; HDL- High Density Lipoprotein*

2.2 Classifiers

2.2.1 Decision tree

The tree induction algorithms ID3, C4.5, C5 advanced by [18] partition data in a hierarchical manner in the form of a tree where branches are represented by values of a particular selected attribute. An optimal tree is formed by selecting a feature at each node that gives the highest Information Gain (IG). Highly mixed partitions are nominated for further subdivision. In this work, we pursue a simpler version of DT where no model of data is learned but an appropriate leaf is directly accessed by mining through the training set. It is appropriate to call this DT variety - Decision Branch (DB).

2.2.2 Nearest neighbor

The NN algorithm used in this study is an adaptation of the well-known k-NN technique [41] for nominal data. It uses the Hamming loss for a distance function in the pseudo-space of data attributes. The loss, which normally counts dissidence of attribute values of two compared instances, is weighted by Information Gain (IG) to make the space metric conform better to the data [42,43].

2.2.3 Naive Bayes

This is a classical method and widely used on nominal data despite the limiting assumption of attribute conditional independence, given a class [44].

2.2.4 Classifying with MVs

The NB classifier is easily adaptable for data with MVs since any test instance can be evaluated with some attributes withheld. However, this property also holds for NN and DB methods. This feature of classification algorithm implementation is the short memory, or lazy learning mode, whereby the learning is carried out anew for every test instance. Indeed, this mode offers a general method of obviating MVs when classifying any new data.

2.3 Filling-in the Blanks

For a discrete or categorical variable with MVs, some dummy value can be assigned to denote the missing value (e.g. "MV"). However, such an assignment of a dummy value outside the attribute's domain cannot be carried out as elegantly with numerical features. Statisticians are known to have resorted to the insertion of dummy data (e.g. "999.999") that invariably distorts distance metrics underpinning classifiers. The distortion of results when using distance metrics then provides an additional rationale to discretize continuous attributes in mixed attribute type domains. If MVs are sparsely distributed, they can be ignored during the learning and generalization steps of the algorithm. However, this is not possible for the data in this study because of the highly expressed attribute patterns of MV inundation.

Some condensation of incomplete data can also be achieved by discarding instances or attributes replete with MVs. However this cannot be a general method as only the training set can be dealt with in such a manner. Therefore incomplete information dismissal is proposed as a pre-processing step in the next section and is the first part of our approach for MV handling.

2.3.1 Incomplete information dismissal

Data layers, namely instances or attributes, are eliminated one by one, whichever currently conveys the least information, until a predetermined data reduction effect is achieved. Attribute information is calculated using IG, and is associated with any value unless it is missing. An attribute may be dismissed, even though it may have no MVs, which doubles as a feature selection step [11].

A data completion algorithm as proposed in this research utilizes the ability of classification algorithms to classify data without referencing MVs. The knowledge of class of an instance being dealt with provides a clue to MV substitution from applicable

ranges. However, it is not required to label all of the classifier training dataset. Data completion forms the second part of the proposed technique.

2.3.2 Data completion

Our algorithm performs completion and classification of test instances at the same time by substituting the attribute modes for MVs from an applicable sample of training data, which a classifier accesses to make the prediction. It is necessarily an iterative process of tuning instances in turn to the rest of the set that requires at least one valued instance per attribute per class. MVs are substituted from the subset with the same class label as the test instance within the extracted sample, whether the predicted class is the same or not. In the case where the test instance is not labeled, the respective classification algorithm is used to set the label. The iteration ends when the introduced values stop changing or a limit for the number of cycles is reached. The goal is to achieve the highest possible classification accuracy, which the training set assumes, even though the instances may be rare.

2.4 Assembling an Appropriate Dataset

Despite the preponderance of patient data collected in digital forms, assembling an appropriate dataset to explore efficient diabetes management methods is inherently difficult because of a paradox in the formulation of the analytics exercise: on one hand, one cannot readily frame a question of interest without knowing what data is available, and on the other, one cannot identify what data is required without knowing the question of interest. The paradox presents itself in data mining process models such as Cross Industry Standard Process for Data Mining (CRISP-DM) [45], where the need to identify business objectives is advanced as a first step so that appropriate questions can be formulated to guide the selection of data. There are no clear 'business' objectives in diabetes mining, as the questions of interest are usually framed as high level questions such as "Identify risk factors for diabetes", or "Predict blood glucose level" that cannot inform the selection of data, because variables that might be relevant are not known. In this study we advance the claim that the paradox inherent in assembling a dataset for diabetes mining necessitates the use of an extensive set of features that not only consists of features relevant only to diabetes but covers a range of other health and clinical indicators.

3. RESULTS AND DISCUSSION

3.1 Classifier Performance

The performance of Naive Bayesian (NB), Decision Branch (DB) and Nearest Neighbor (NN) classifiers in diagnosing diabetes, CVD and hypertension when applying the traditional model in Fig. 4 with MVs skipped, is compared to the accuracy after MV imputation using different strains of the proposed method in Fig. 5. The strains are denoted as NB, DB, and NN - same as the classifiers at the core of the principal method. The accuracy is calculated using leave-one-out cross-validation which is a conventional technique when a comparison is involved.

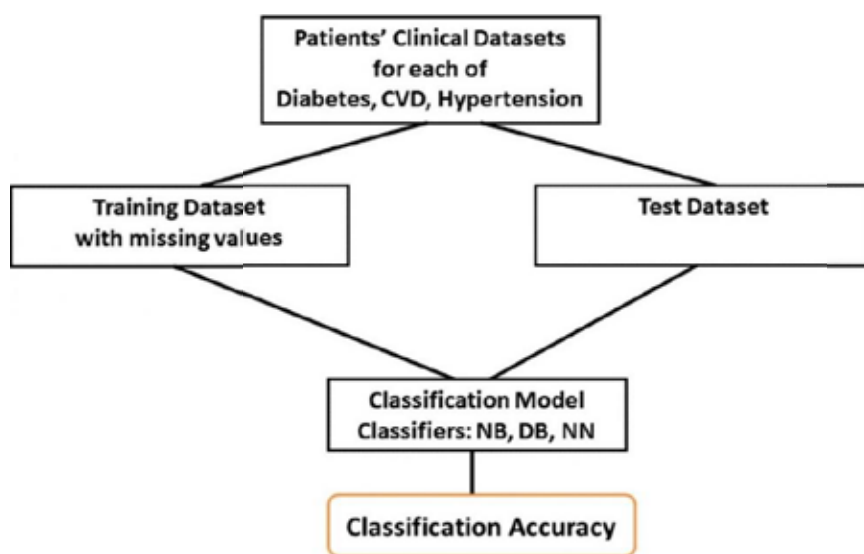


Fig. 4. Traditional classification model with missing values

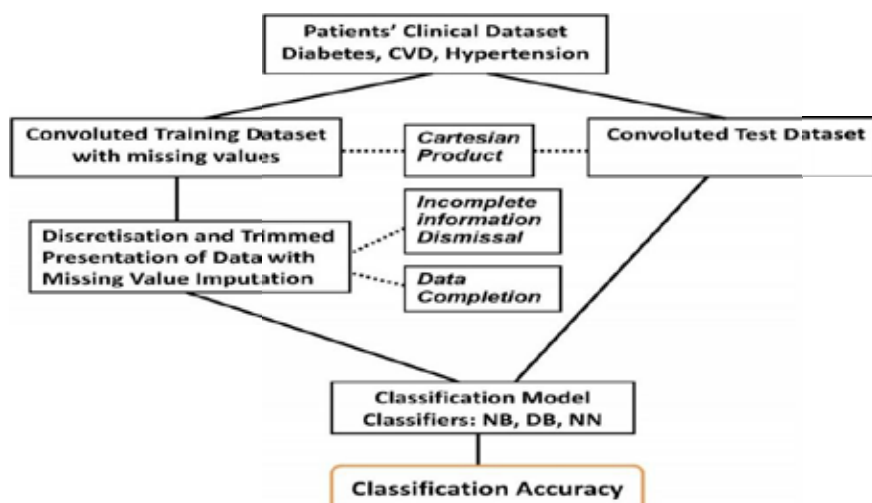


Fig. 5. Proposed classification model with missing value imputation

Fig. 5 provides an overview of the proposed classification model using our novel MV imputation techniques. The transformation of the training and test set involves convolution of class values for diabetes, hypertension and cardiovascular disease using *Cartesian Product*. The *Incomplete Information Dismissal* and *Data Completion*, after having any continuous features discretized, are performed prior to exposure of the dataset to the three classifiers. These three moments form the main novelty of our proposed model.

To evaluate the performance of our proposed *Incomplete Information Dismissal* method, we obtain a smaller dataset by reducing the amount of data by 50%. Fig. 6, used for illustration, provides the overall, any-class accuracy for both full and reduced datasets after performing data completion using the DB strain of the proposed method. It is evident from Fig. 6 that the reduction not only does not impact on the diagnostic ability, but also gives an improvement in some cases. At the same time, about 40% of MVs have been dealt with, without having to fill them. Different results pertain to different sub-problems featured within the DiScRi data.

To illustrate the performance of our proposed *Data Completion* method, the accuracy of the three classifiers when sidestepping MVs and after entering them using the DB strain of the principal method is compared in Fig. 7. For example, with DB substituted MVs, the NN classifier achieved 97% accuracy for CVD diagnosis with the full dataset as compared to 98% with the reduced dataset. High accuracies were also achieved for the diagnosis of diabetes (94% to 95%), with some exception for hypertension (90% to 89%), which had a minor decrease, using this combination. Similar results were obtained for NB and NN based completion methods for each of the three classifiers.

3.2 Benchmarking

We staged a super problem where classes are defined by *Cartesian Product* of class values for diabetes, CVD and hypertension: this is a novelty of our approach that complements our unique imputation techniques of *Incomplete Information Dismissal* and *Data Completion*. For example, an instance may have the new attribute value as YNY (Yes for diabetes, No for CVD status and Yes for hypertension). This 'additional' class is used to take advantage of the nearest points formulation to cater for incomplete information dismissal and data completion. The advantage is that MVs on other attributes are imputed in a way that exalts the new triple attribute.

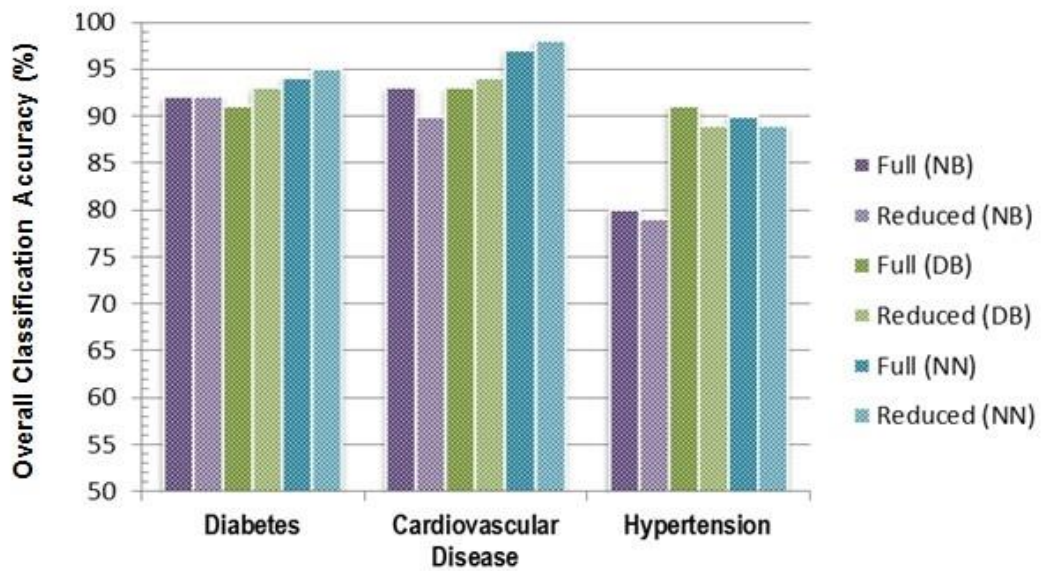


Fig. 6. Overall classification accuracy (%) on full and reduced datasets – by different classifiers (NB, DB, NN) after substituting MVs with Decision Branch inspired surrogates

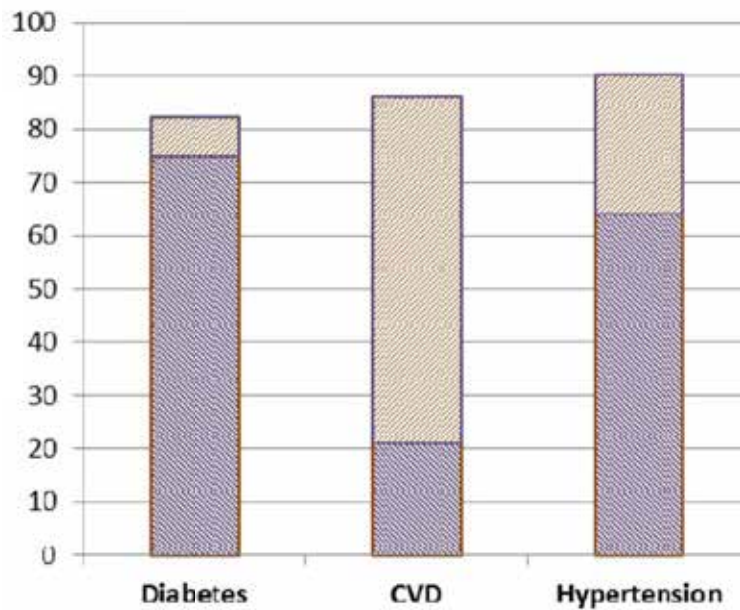


Fig. 7. Improvement of diagnostic accuracy after MV submission after applying the cartesian product

Dark portion: Class 1 diagnostic accuracy with MVs skipped; Light portion: Accuracy gain after Data Completion using the DB strain of the proposed method. The classifier is NN

The improvements in the diagnostic accuracy of our algorithm are benchmarked using the three classifiers. The results of NN accuracy for full data of Class 1 is shown in Fig. 7 for both before and after data completion by the DB based method.

3.3 Discussion

Overall, from the performance results it is evident that the diagnostic predictions are better after data completion. While each classification method has its own merits and demerits, a particular advantage of our data completion procedure is that it imparts better estimation of any involved probabilities effectively extending the feature-set.

The classifiers sidestepping MVs achieve low accuracy in the diagnosis of diabetes, cardiovascular disease as well as hypertension. Also, when MVs are ignored and replaced with dummy data, the results are similar. This is probably due to the attribute rather than instance pattern of inundation of data with MVs, as shared by the entire dataset. Hence, we can infer that the affected attributes with MVs are predominantly irrelevant.

The performance of the NB based MV submission method in the current work stands out. The algorithm not only completes the iterations much faster but also rather accurate. The breadth of mode selection in the algorithm causes high contraction of data distribution in the pseudo-space of attributes, that is, classes become identified by the distinct feature modes. The DB guided MV submission performed slower and somewhat less accurate over the NB counterpart, although any possible improvement may have been restricted due to the data. The NN based data completion method shows the least improvement, although the accuracy is still acceptable. This is quite contrary to the usual high performance of the NN classification method and has to do with choices available for MV selection that are more limited than in completion with DB.

In medical diagnostic problems, the attribute pattern of MV inundation is often prevalent. Reducing the data set by 50% leaves all instances intact, though this is not the case with the number of attributes. Our algorithm tries to withhold attributes that are either less informative or with many MVs. In either case, trimming by half appears to be safe for all diabetes linked problems as the results are almost unchanged. Nonetheless, if too many features are removed the accuracy is expected to drop.

Also, even though individual features are ranked by overall information gain, and attribute reduction occurs only for those that are least informative and found at the end of the list, improvement in accuracy may not be always guaranteed. However, the computational aspect of performance improves dramatically when such superfluous attributes are discarded.

While the results obtained are good, filling many missing entries could be misleading. The data is too flexible, and the high accuracy may be unwarranted. In this regard, the more classes are embraced by a problem, the better. However, here there are only two for any featured condition. There are no other constraints to narrow the range of MVs further. By linking the diabetes, cardiovascular and hypertension classes, additional clues can be arrived at. The three problems together interpret the same data, and so we expect the substituted values to be the same. Hence, we have used a convolution of the three to stage a super problem where classes are defined by the Cartesian product of class values of the underlying problems. Cartesian attribute products in classification were made popular by [46]. Here, each combination of the values corresponds to a class in the super problem. This forms the main novelty of our approach of MV imputation as compared to existing ones in the literature. In our model comprising the three problems with two classes, the Cartesian product generates eight classes same in all problems, thereby imposing much tougher constraints on MV ranges. This approach is innovative and provides an advancement towards an integrated and holistic management of diabetes.

4. CONCLUSION

Large clinical data collected from patients often include missing values or incomplete data, which poses a major problem for an integrated diagnosis. Data mining techniques dealing with such incomplete data problems in clinical trials become popular. This work demonstrated a considerable improvement in diagnostic accuracy after adopting the proposed methodology for missing value submission. The data completion methodology can be applied to data of any type via discretization of continuous attributes. The advancement is significant because quite high predictive accuracies, as measured with leave-one-out cross-validation resampling, appear to be achievable even when datasets contain substantial missing data.

Future work could involve the development of decision rules derived through the learning mechanism of our novel missing value handling techniques of *Incomplete*

Information Dismissal and *Data Completion* in order to arrive at a decision tree model for new patients with clinical data. This would provide an enhanced decision support system for an integrated diabetes management, despite missing values in the patient's clinical data.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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Effect of Tb³⁺ Doping Concentration on Luminescent Properties of Sr₃B₂O₆ Phosphor

ABSTRACT

The Sr₃B₂O₆:Tb³⁺ phosphors with different concentration of Tb³⁺ were prepared by combustion method combination with heating at high-temperature. Results of the crystalline structure measurement indicate that the Sr₃B₂O₆: Tb³⁺ phosphors have a rhombohedral single phase. The excitation spectra show that the phosphors can be excited by ultraviolet light of near 379 nm. The emission spectra under 379 nm excitation includes several narrow lines, which is ⁵D - ⁷F (j = 2, 3, 4, 5, 6) transitions of Tb³⁺ ion in the lattice.

The emission intensity of Tb³⁺ in Sr B O is influenced by the Tb³⁺ doping content and ^{3 2 6} optimum concentration is 3% mol. The concentration quenching of Tb³⁺ in this phosphor occurs when Tb³⁺ concentration is over 3% mol. The concentration quenching mechanism was determined dipole-quadrupole (d-q) interaction by using Dexter's theory.

Keywords: Terbium; Sr₃B₂O₆; combustion method; concentration quenching.

1. INTRODUCTION

The development of luminescent materials doped with rare-earth activator is subject of extensive researches for a long time, including such applications as fluorescent lamps, light emitting diodes, field emission displays and many others. In the field of white light emitting diodes (wLED), wLED was obtained by using a blue LED chip and the yellow-emitting phosphor [1]. Besides, many efforts have been made in the search of a phosphor, which can convert ultraviolet (UV) or blue light into a combination of red-green-blue light to obtain white light emission. For this reason, it is necessary to develop green emitting phosphor in the field of optical materials. Among the green emitting phosphors, Sr₃B₂O₆: Tb has main emission wavelength at 542 nm, it has potential application for UV-convertible green phosphors in wLED.

Until now, there are not yet many reports on the spectroscopy properties of the Tb^{3+} doped $Sr_3B_2O_6$ phosphor. In recent years, the detail studies on Tb were realized in the several materials: $K Gd (PO)_4 : Tb^{3+}$, $Y Al O_5 : Tb^{3+}$, $Ca BO_3 Cl : Ce^{3+}, Tb^{3+}$ [2-4]. On the other hand, the luminescent materials base on $Sr_3B_2O_6$ lattice have only prepared by solid-state reaction method [5,6], sol-gel method [7]. This paper presents the synthesis of the $Sr_3B_2O_6 : Tb^{3+}$ phosphors by combustion method, the studies the effect of Tb^{3+} ion concentration on luminescent properties and the concentration quenching mechanism in this phosphor.

2. EXPERIMENTAL DETAILS

The $Sr_3B_2O_6 : Tb^{3+}$ phosphors with different concentration of Tb^{3+} were fabricated by urea nitrate solution combustion method combination with heating at high-temperature. The raw materials include $Sr(NO_3)_2$ (Merck), H_3BO_3 (AR), Tb_4O_7 (Sigma). Terbium oxide was been nitrified to become nitrate solution of Terbium. Urea (NH_4NO_2) was used to supply fuel for combustion process.

Aqueous solution containing stoichiometric amounts of nitrate metals and urea was mixed and heated at $70^\circ C$ by magnetic stirrer in 2 hours to become a gel. Next, the gel was combusted at $590^\circ C$ in 7 minutes then it was decreased down to room temperature, the powder was obtained. The powder was heated at $900^\circ C$ in air within 1 hour, the final obtained product is white powder.

The phase structure of the products were characterized by X-ray diffraction (XRD) using a Bruker D8-Advance X-ray diffractometer. The emission and excitation spectra were recorded by a Fluorog 3-22 (Horiba Jobin-Yvon) with the 450 W Xenon excited lamp at room temperature.

3. RESULTS AND DISCUSSION

To demonstrate the pure phase and structure of the $Sr_3B_2O_6 : Tb^{3+}$ phosphors, powder X-ray diffraction (XRD) measurements of these samples were carried out and shown in the (Fig. 1). The similar diffraction patterns were observed for each sample, which indicates that doping a little Tb^{3+} content does not affect the crystalline structure of the $Sr_3B_2O_6$ lattice. (Fig. 1a and b) show the XRD pattern of $Sr_3B_2O_6 : Tb^{3+}$ (1% mol) and $Sr_3B_2O_6 : Tb^{3+}$ (3% mol), respectively. It is clearly observed that all samples have Rhombohedron single phase.

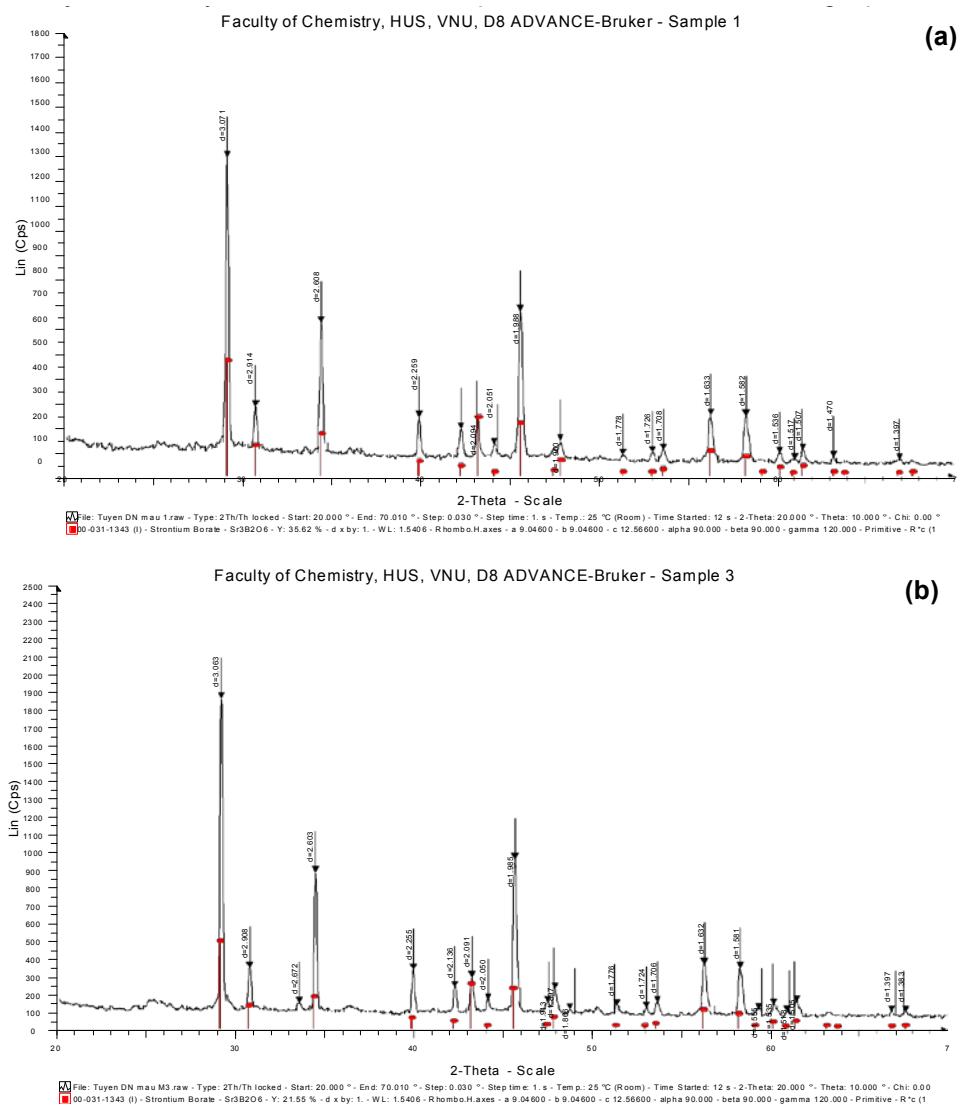


Fig. 1. XRD of $\text{Sr}_3\text{B}_2\text{O}_6: \text{Tb}^{3+}$ (1% mol) (a) and $\text{Sr}_3\text{B}_2\text{O}_6: \text{Tb}^{3+}$ (3% mol) (b)

The photoluminescence excitation (PLE) spectra monitoring at $^5\text{D}_4 - ^7\text{F}_5$ (541 nm) transition of $\text{Sr}_3\text{B}_2\text{O}_6: \text{Tb}^{3+}$ (3% mol) sample is shown in (Fig. 2a). The PLE spectrum is sharp lines in the region 300-400 nm corresponding to the 4f-4f transitions in Tb^{3+} ion.

The photoluminescence emission (PL) spectra of $\text{Sr}_3\text{B}_2\text{O}_6: \text{Tb}^{3+}$ (3% mol) sample under excited radiation $\lambda_{\text{ex}} = 379$ nm is shown in (Fig. 2b). The emission spectra presents four narrow lines at around 486 nm, 541 nm, 592 nm and 611 nm, which originate from the transitions between the excited $^5\text{D}_4$ level and $^7\text{F}_j$ ($j = 6, 5, 4, 3$) ground levels of Tb^{3+} ion, respectively. The $\text{Sr}_3\text{B}_2\text{O}_6: \text{Tb}^{3+}$ phosphor has the green light emission which due to the strong $^5\text{D}_4 - ^7\text{F}_5$ transition. The PLE spectra of all

samples with different concentration of Tb^{3+} ion are shown in (Fig. 3). All spectra have the same shape and reach the maximum intensity at 3% mol.

(Fig. 4) presents PL spectra of $Sr_3B_2O_6: Tb^{3+}$ with different concentration of Tb^{3+} ion. Accordingly, we can observe that the wavelength of ${}^5D_4 - {}^7F_5$ (541 nm) transition in these samples don't change, it located at 541 nm. But emission intensity changes over Tb^{3+} concentration. The emission intensity increases with the increasing of Tb^{3+} doping content, and reaches a maximum at 3% mol, then decreases. The result was shown in (Fig. 5). The phenomenon of decrease in emission intensity after a certain concentration is called concentration quenching and is attributed to energy migration among rare earth ions.

As a representative on the (Fig. 5), concentration quenching was observed when Tb^{3+} content was over 3% mol. Non-radiative energy transfer from one Tb^{3+} to another Tb^{3+} ion may occur as a result of an exchange interaction, radiation re-absorption or multiple-multiple interaction [8]. The exchange interaction is generally responsible for the energy of forbidden transition [4,9,10]. The mechanism of radiation re-absorption comes into effect only when a broad overlap of the fluorescent spectra of the sensitizer and activator appears [8]. Due to there is not sensitizer in this phosphor, the overlap does not exist. It means that the mechanism of exchange interaction and radiation re-absorption plays no role in the energy transfer between Tb^{3+} ions in $Sr_3B_2O_6$. So the concentration quenching mechanism of Tb^{3+} must be the electric multiple-multiple interaction as suggested by Dexter.

According to Dexter's theory, if the energy transfer between the same sorts of activator, the multipolar interaction can be determined from the change of the emission intensity. The dependence of the luminescent intensity on the activator concentration can be described by the equation (1) [4,11]:

$$\frac{I}{x} = K [1 + \beta x^{Q/3}]^{-1} \quad (1)$$

Where, the constant β refers to the quenching mechanism by multipolar interaction. The parameter Q is different for different types of interaction: 6, 8, 10 for dipole-dipole (d-d), dipole-quadrupole (d-q) and quadrupole-quadrupole (q-q) interaction, respectively. The value Q has been determined graphically from equation (2):

$$\log\left(\frac{I}{x}\right) = c - \frac{Q}{3} \log x \quad (2)$$

Where I is the emission intensity of $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ phosphor, and x is the Tb^{3+} content. (Fig. 6) presents the plot of $\log(I/x)$ as a function of $\log x$. The Q value for $^5\text{D}_4$ transitions in this phosphor was calculated by linear slope, the slope calculated from plot is about -2.8. Therefore, the value of Q can be calculated to be 8.4. This result suggested that the concentration quenching mechanism in $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ is the d-q interaction.

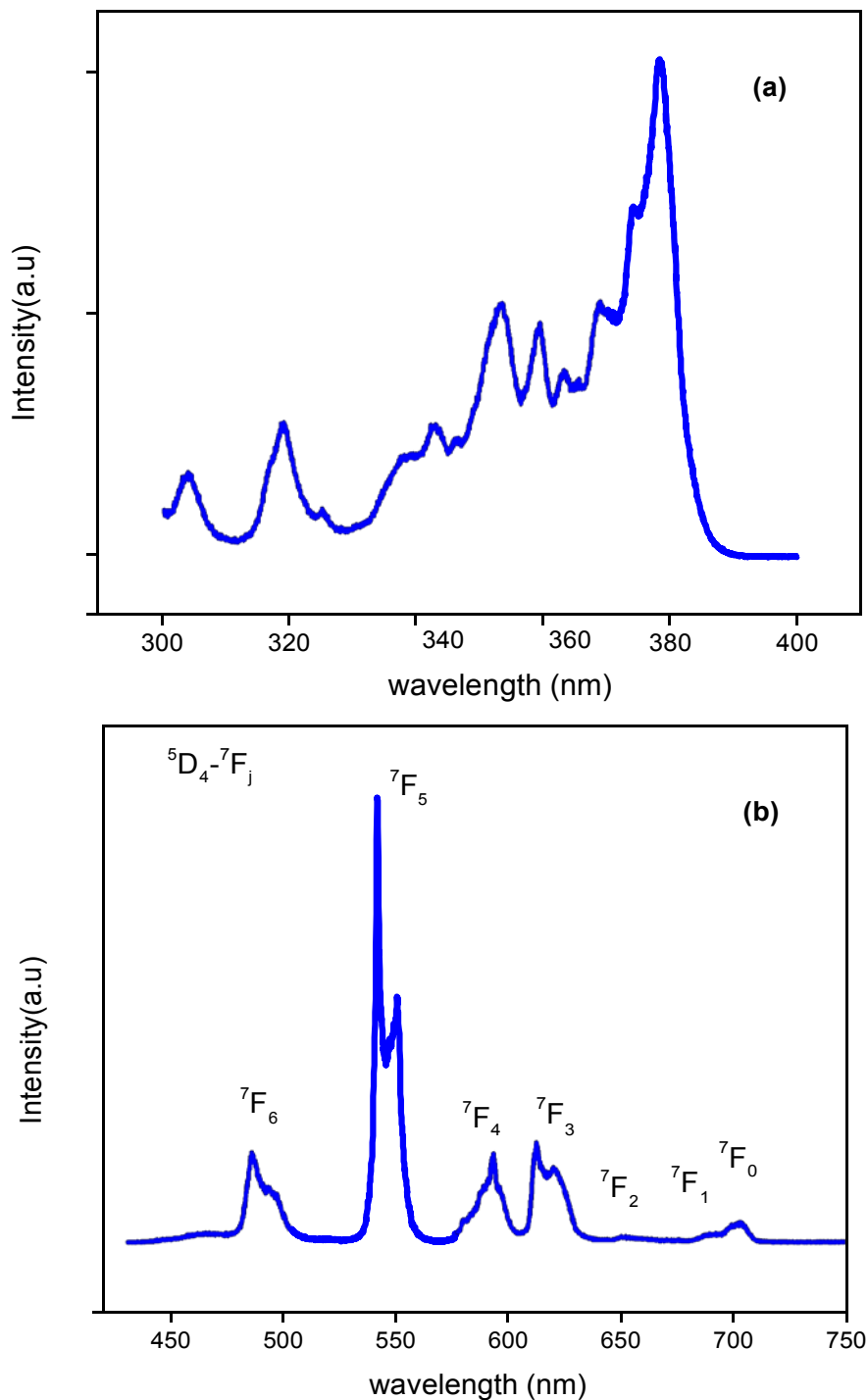


Fig. 2. PLE (a) and PL (b) spectra of $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ (3% mol)

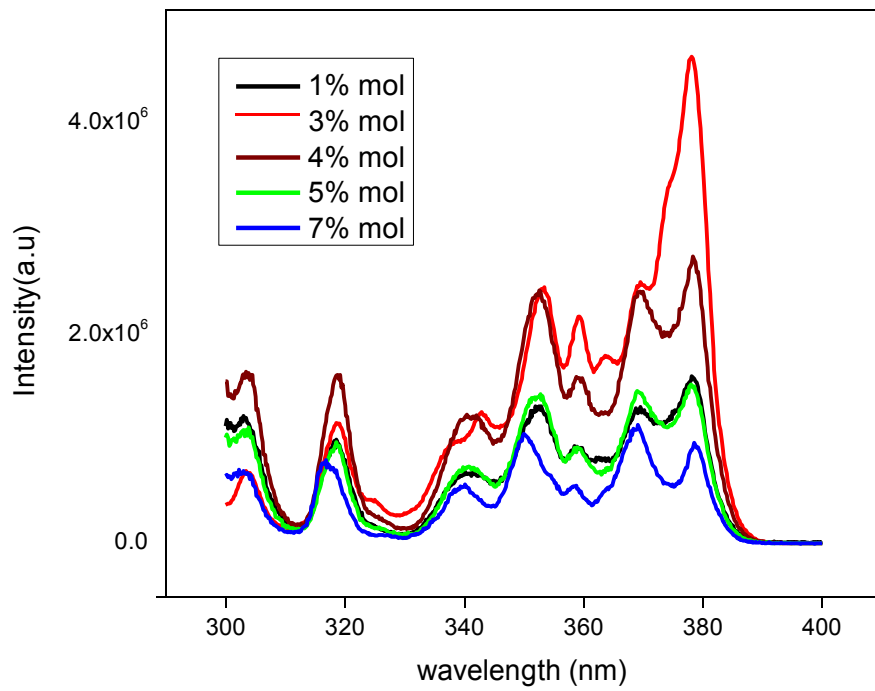


Fig. 3. PLE spectra of $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ phosphors with various Tb^{3+} concentration

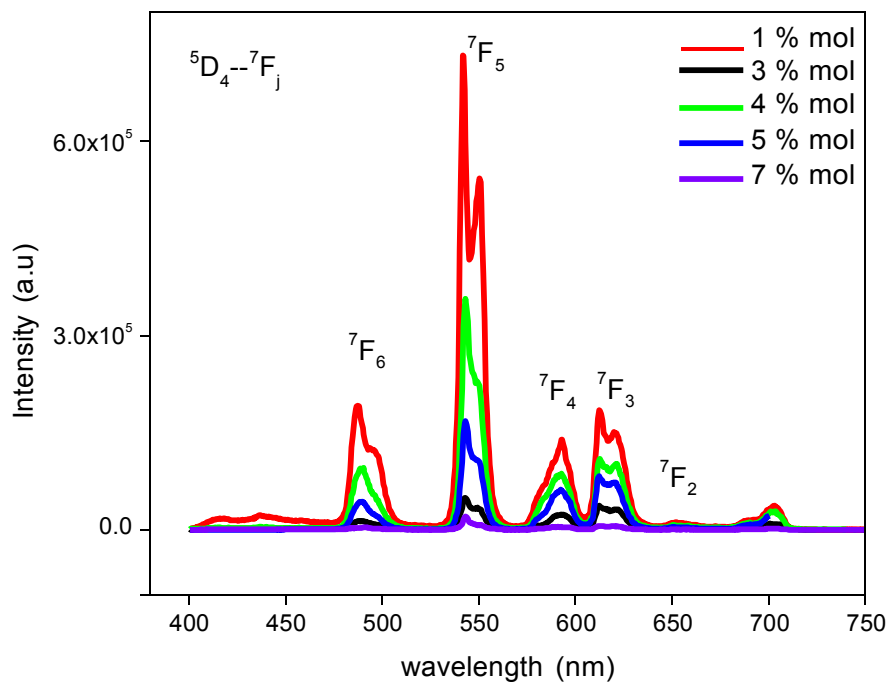


Fig. 4. PL spectra of $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ phosphors with different concentration of Tb^{3+} ion

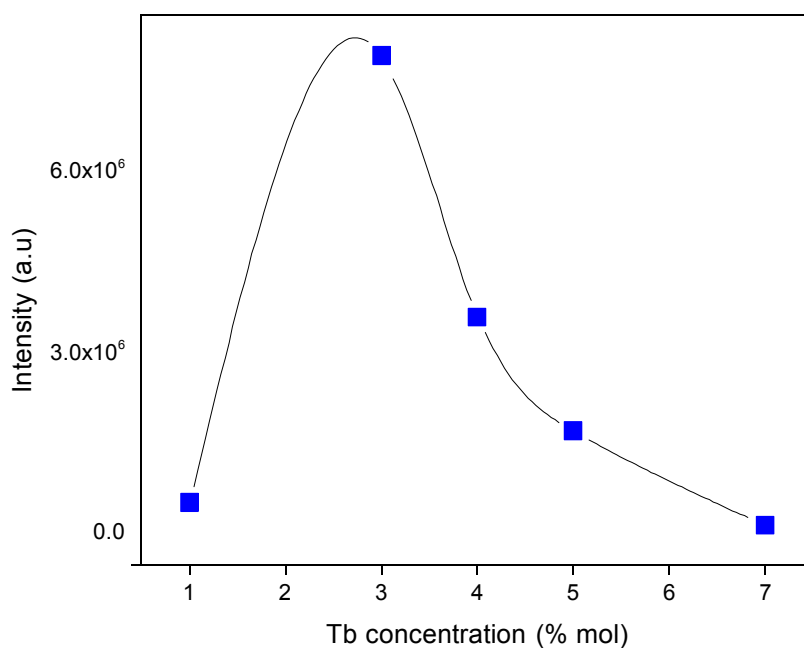


Fig. 5. The plot of intensity (5D_4 - 7F_5) versus Tb^{3+} ion concentration

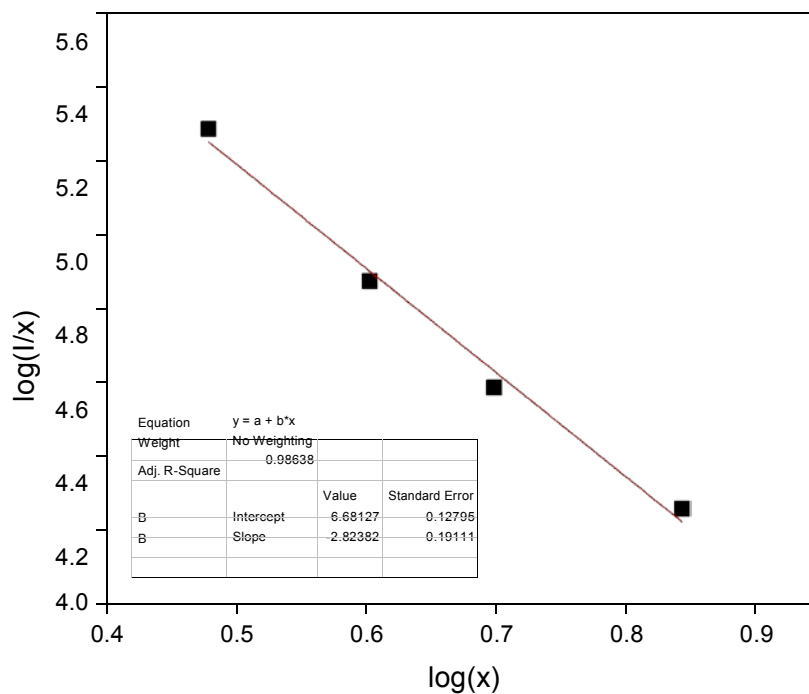


Fig. 6. Plot of $\log(I/x)$ versus $\log x$ in $Sr_3B_2O_6:Tb^{3+}$ phosphors

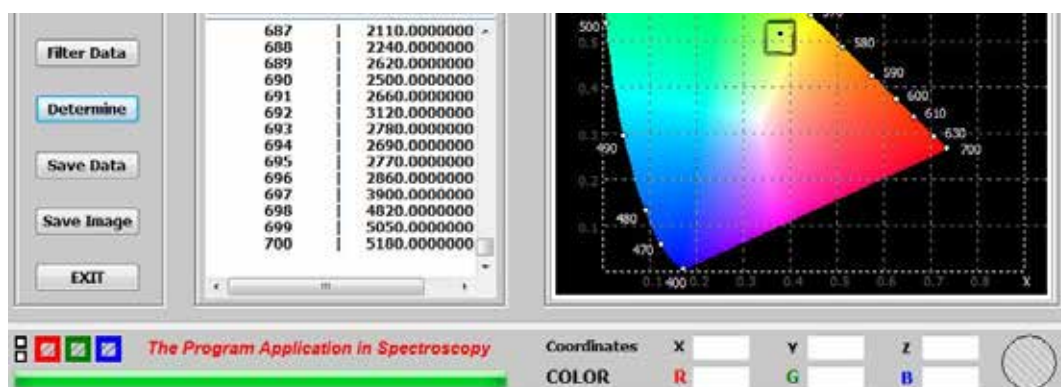


Fig. 7. CIE chromaticity diagram for $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ (3% mol) phosphor

Fig. 7 shows the CIE chromaticity coordinates of $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ (3% mol) under 379 nm excitation. The CIE coordinates are $x = 0.38$, $y = 0.52$, $z = 1.10$, it can be found in the yellowish-green region. It shows that $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ convertible green phosphors in wLED.

4. CONCLUSION

In summary, $\text{Sr}_3\text{B}_2\text{O}_6:\text{Tb}^{3+}$ green emitting phosphors were prepared by urea-nitrate solution combustion method, after combustion process samples were annealed at 900°C in air within one hour. These phosphors have rhomboidal single phase structure. The results of PL and PLE spectra indicate that the emission intensity changes over concentration of Tb^{3+} ion. The emission intensity increases with the increasing of Tb^{3+} doping content, and reaches a maximum at 3% mol. The concentration quenching was observed when Tb^{3+} content over 3% mol and the concentration quenching mechanism in the phosphors was determined dipole-quadrupole (d-q) interaction by using Dexter's theory.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Mobile User Motion Detection and Traffic Road Management

ABSTRACT

The vision of next generation networks is to offer a real time services such that traffic situation on the major or minor roads. While 3G networks are based on wide area cell concept, 4G will be a hybrid network that use wide area network with Ad-hoc network. In this paper we propose two algorithms, the first algorithm describes how information is disseminate in our system Virtual Explore (VE). VE is a motion detection system that able to predict the mobile user destination. The second algorithm is α -path prediction algorithm that predicts the destination of mobile user based on his previous movements, we expect that our proposed system will reduce the traffic rate between (40-50%) in the case of accidents or in the congested locations. Our analytical results show that the prediction accuracy in our work will vary from 20-40% if we maintains a prediction correctness in the range 40-50%. Considering our goal the prediction accuracy is considered a good results in comparison with other works in the same context.

Keywords: received signal strength; path prediction; motion detection; traffic management; information dissemination.

1. INTRODUCTION

Next generation networks will employ hybrid network architectures using both cellular and Ad-hoc network concept.

Determining the location of mobile terminals relies on the cellular network infrastructure and protocols to provide a reliable and accurate estimate of mobile terminals position without the need of global positioning system GPS [1] or any other positioning system [2,3,4]. Using GPS for localizing the mobile terminal is an interested option for high end applications but is not well suited for all contexts. For example, in the dense urban area where some time satellites are not visible from the mobile terminal or in the country where a few information about the transport

infrastructure is available, it is necessary to find another methods to localize the mobile terminal.

Due to the importance of mobile phone in our life, it is necessary to provide a new services that make the user life more comfortable, this is the main idea behind proposing our system. It consists on providing the user a real time information about the traffic road to help in traffic management.

Our system detects and observes the movement of mobile user on the urban roads to predict with high accuracy his destination. In this paper, we propose a virtual explorer system that is hybrid system that collects information about the movement model of mobile user, analyses it, and try to predict his destination in order to give him correct information about the roads followed by him until arriving at destination. People are more likely to pass less time on the roads, sometimes the path from home to work takes longer time than expected due to interruptions, accidents, bad roads situation due to weather conditions. Knowing in precedence the condition of the road can help in providing alternative path that makes the user more satisfied. Our proposed system is composed on three parts are: mobile user (that is a passive one) where it is used the signal received from his mobile phone to define his location. Fixed base station located on the side of the road has the role to sense the entrance of mobile terminal his area and it determines his location and it calculates his velocity, and sends the information to central base station. CBS (Central Base Station) is the third components of our system have the role to predict the user destination and to provide him an alternative path if necessary.

So, our work is divided into three parts are user identification, distance estimation and path prediction. Our system to work correctly information must be disseminate between base stations and central base station, for that it is necessary to provide a routing mechanism that route the information with low cost and high speed. The rest of this paper is organized as follow: Section 2 contains description of our system and its components. Section 3, explains how VE works, user identification and distance estimation mechanisms. Section 4, presents our α -path prediction algorithm. Section 5, contains our analytical results. Then, some previous works and finally conclusion and future works.

2. SYSTEM DESCRIPTION

Our proposed system is called Virtual Explorer, it is composed of three main components are: mobile terminal, base station and MSC (Mobile Telephone Switching Center).

2.1 Mobile Terminal

Mobile terminal that represents the user that holds mobile phone denoted as A_i . It refers to physical terminal 3G mobile phone GSM with frequency 900-2100 Mhz. When the mobile phone starts working, a handshaking is done between the mobile unit and the MSC center to identify it and to assign to it the channel on which it can transmit. When the mobile terminal moves from one location to another, a handshaking is done with the base stations of the visited cells to maintain the communication during the handoff process. In VE, the mobile phone can be only in active state.

2.2 Base Station

Base station is a fixed station in a mobile cellular system used for radio communications with mobile units. They consist of radio channels, transmitter and receiver antenna mounted on a tower. Denoted as F_{ij} where i indicates its number and j indicates the company to which it belongs (MSC).

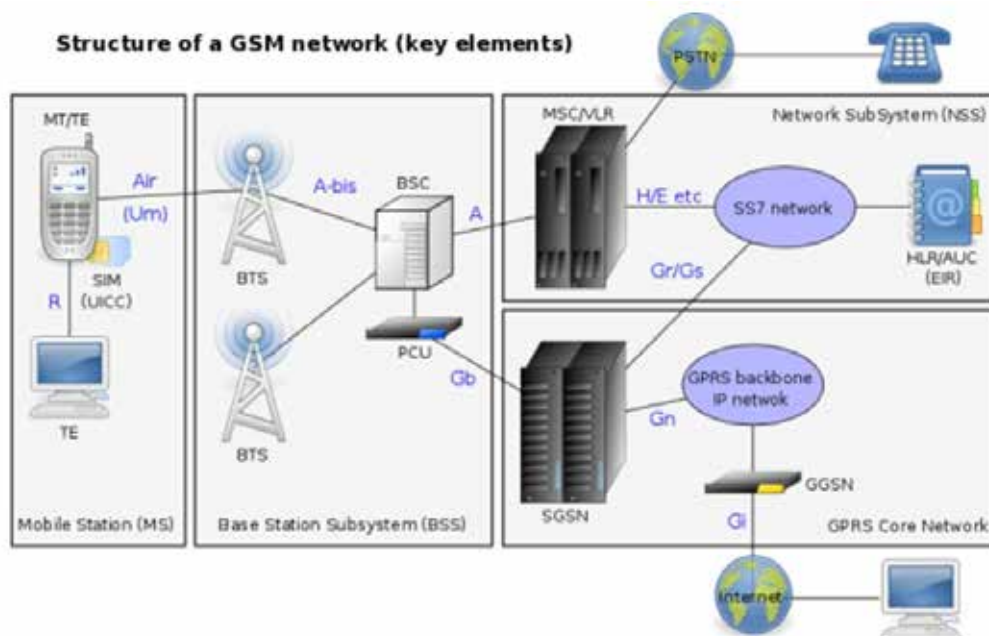


Fig. 1. Structure of GSM network

The base stations are situated on beside of the road, have the role of sensing the access of the mobile terminal in their area, identify it and send the related information to the correspondent MSC. In cities, each base station has a range up to 0.5-5 miles (0.8-8 km). All the base stations are connected to telephone exchange switches of the cellular company. In cellular system each mobile switching center serves cellular system of 50-100 cells. Base stations are supported by inter-connection to each other and to the Public Switching Telephone Networks (PTSN) via Mobile Telecommunication Switching Center (MSC), Fig. 1.

- Mobile Telephone Switching Center (MSC).

It provides links between the cellular network (composed from Mobile Terminal MT, Base Station BTS) and Public Switched Telecommunication Network (PTSN), Fig. 1. It is an information station responsible about collecting, analyzing and distributing information to/from all the system components. So, has the role to predict the path of the mobile user to provide him a service and information about the road situation.

Our system provides the implementation of prediction algorithm that takes the information received from the BS's as input and produces the destination as output. Denoted as C_j .

MTSC supports four databases:

1. Home Location Register Data Base (HLR): that stores information permanent and temporary about each of the subscribers that belongs it (Fig. 2).

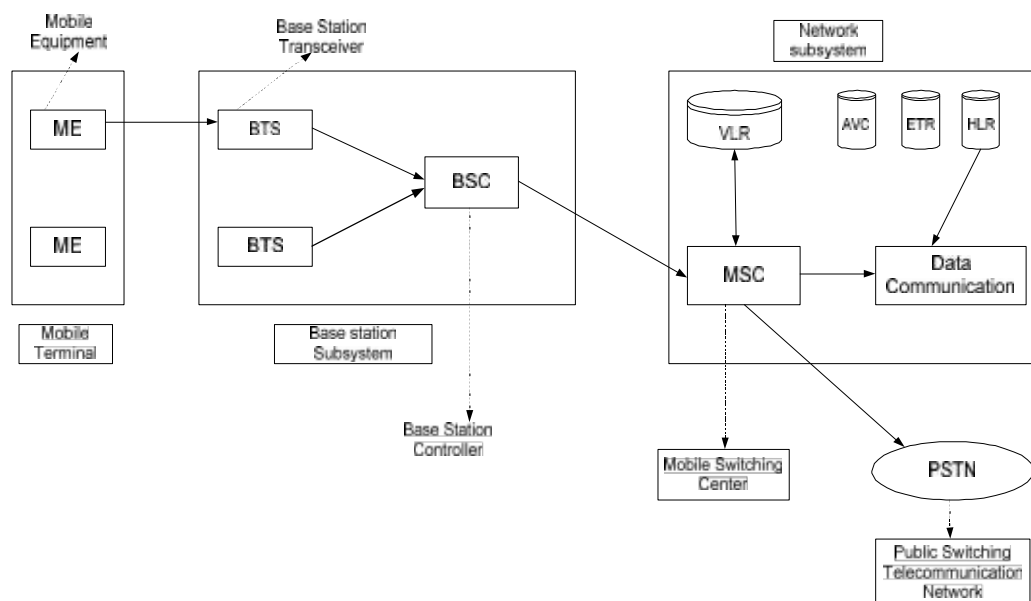


Fig. 2. Mobile Telephone Switching Center (MSC)

2. Visitor Location Register Data Base (VLR): it maintains information about subscribers that are currently physically in the region covered by the switching center. It records if the subscriber is active, and manage the call coming by identifying the both caller and receiver and identify their locations and the area covered them (Fig. 2) [5].

3. Authentication Center Data Base (AUC).

4. Equipment Identity Register Data Base (ETR).

3. HOW VIRTUAL EXPLORER WORKS?

VE starts working from the moment on which the user switches on his mobile phone denoted as A_i . During the movement of A_i a handshaking is done with the base station F_{ij} . Based on that, the base station identifies it, calculates its distance using the signal strength received (RSS) [6,7,8] and it calculates its speed. Its direction is calculated using AOA (Angle of Arriving) technique [8,9,10,11].

We speak about urban roads where the base station has a fixed location.

•At time T_1 the mobile terminal was at distance d from the base station with angle α .

The angle of arriving is calculated as follow: $\cos\alpha = d/L$ where d is the linear distance to the base station and L is the height of the base station.

•At time T_2 the mobile terminal is becoming in location at distance d_2 and angle α_2 . So, its speed is calculated as $v = \Delta d / \Delta T$. α is used to define the direction of the mobile terminal. This information (ID, v , α , T) is sent to the MSC, that is used with the references from other BSs, to predict the destination of the mobile user.

3.1 Assumptions

- our trackers (mobile phone A_i) is the central element of our system, is in active state,
- the base stations is an assistant element,
- C_j is the master element,
- Both C_j and F_{ij} are fixed nodes and the unique mobile element is A_i .

3.2 Distance Estimation

The distance between the mobile terminal and the base station is estimated using RSSI (Received Signal Strength Indicator). This method does not require

additional hardware, but it is based on estimating the distance between two entities (transmitter and receiver) by measuring the signal at the receiving side. RSSI values are not accurate, but can be oscillate due to the effects of fading and environment changes. It depends on the radio transceivers type and on the presence of obstacles. We speak about urban roads where the base stations are situated beside the roads. The distance is estimated given the following relation: $P_{rc} = P_{rt} / d^\alpha$, where P_{rc} is the received signal power, P_{rt} is the transmission power, d is the distance to the base station, and α is path loss coefficient [5].

3.3 User Identification

Each MSC center contains two data bases (as mentioned in section 2) are home location register (HLR) that is a data base that stores permanent information about each of the subscribers that belong to it. And visitor location registers (VLR) that maintains information about subscriber that are currently physically covered by it. When a foreigner user enters the area of the base station a handshaking must be done to ensure to it the connectivity during his staying in the coverage area of the base station, then it is added to the VLR (Fig. 2).

3.4 Information Dissemination in Virtual Explorer

The information collected about the mobile system must be disseminated to the correspondent MSC. When the base station collects information about a home subscriber, it routes this information to its MSC. If the user is a visitor, so the information collected must be routed by a way of MSCs or by a way of the other nodes in the network to the correspondent MSC. So, we need an efficient routing algorithm that can find the best path to the correspondent MSC in short time, in a manner that the MSC predicts his path and provides him a service before he had travelled long distance.

Our system to be able to provide the proposed service a communication between its entities must be done. So, each node must work as router. For that, it creates its routing table in which is inserted all its neighbors by which it can communicate directly. The information stored in the routing table are: the node ID of the direct neighbor, link cost to reach C_j , the cost of communication between two nodes varies given the MSCs that belong to it. Two nodes that belongs the same C_j communicate to each other with cost 0, if the two nodes belong to different C_j the

cost of communication will be 1 (the cost of communication is a cost assigned to the link between nodes).

Then, it is used A* search algorithm to calculate the short distance from any source to any destination. The best path is considered that is done with less number of hops and within base stations that belongs the same C_j . A* uses a best first search and find the least cost path from any initial node to one goal node. It uses a function $f(n)$ that represents the path cost function $f(n)=g(n)+h(n)$, $f(n)$ represents the total cost of the path and that is calculated from the routing table. $g(n)$ is the cost to reach the initial node . $h(n)$ is the cheapest cost from n to the goal [12].

3.5 Algorithm Description

VE can be represented by a graph $G=(V,E)$ where V is a set of nodes represent the base stations F_{ij} or MSC (C_j) and E is a set of bidirectional links between the nodes of the graph.

3.6 Neighbors Discovering Phase

Each F_{ij} when start working, it broadcasts a hello message to discover its neighbors and set a time out t . t is the time needed to a radio waves to travel a distance equal to the transmission range. If the time out is ended without any receiving answer. F_{ij} waits another time t and restart the discovering process until an answer message is coming from one neighbor. F_{ij} inserts the identities of the nodes that have sent an answer message in a list called neighborhood list. Used later for the construction and the update of the routing table Fig. 3.

3.7 Network Construction Phase

In this phase each node creates its routing table that is used to forward the information to the appropriate C_j . All the neighbors nodes are considered in the range and can communicate to them directly, but the cost of communication is vary based on the C_j to which they belong. To the link between the nodes that belong the same C_j is assigned a value 0, and a value 1 is assigned to the link between the nodes that belong different C_j s. After setting up the link with neighbors, each node creates its routing table.

Each node exchange its routing table with their neighbors and so constructs the path, and the cost to reach C_j (Fig. 4).

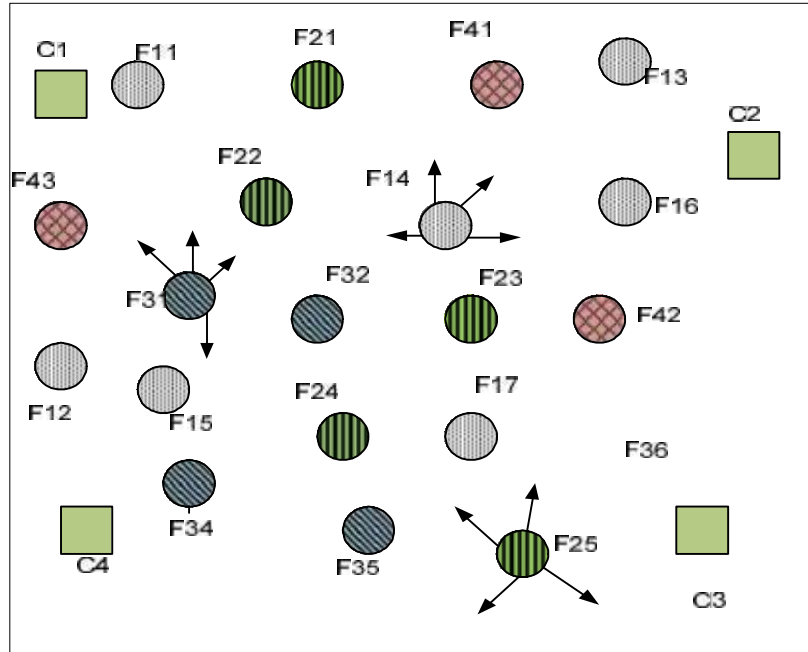


Fig. 3. Neighbor discovering phase

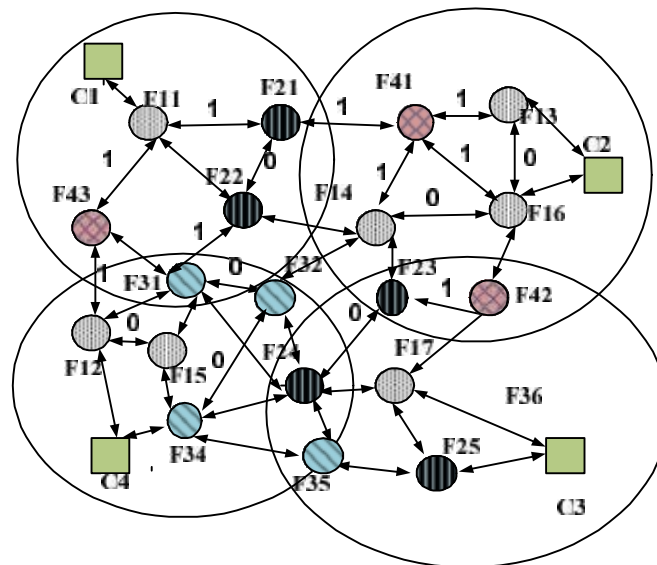


Fig. 4. Network construction phase

Example:

Considering A_i is a mobile terminal that moves from one area to another as in Fig. 5, when A_i enter the area of F43, it senses its presence and identifies it that belong to C_2 . So, F43 search in its routing table about the best path to C_2 .

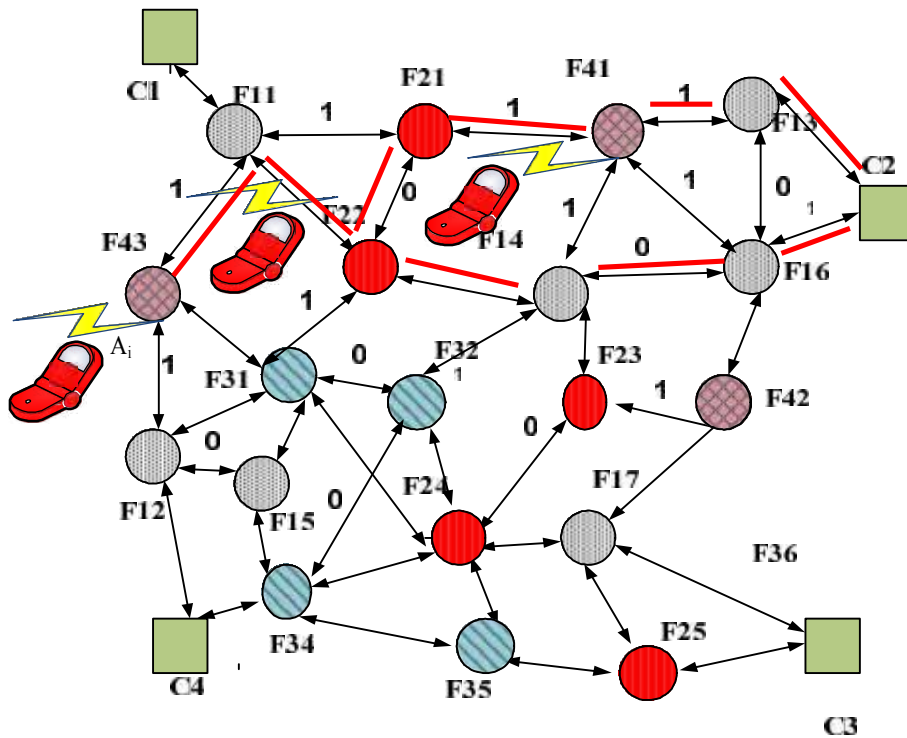


Fig. 5. Example of motion detection in virtual explorer

As is viewed in Fig. 5 two possible paths are presented. The first is by a way of F_{11} ($F_{11}, F_{21}, F_{41}, F_{13}, C_2$) with cost 5 and the second is by a way of F_{22} ($F_{11}, F_{22}, F_{14}, F_{16}, C_2$) with cost 4. The cost is calculated as follow:

$$f(n) = g(n) + h(n),$$

$g(n)$ is the cost to reach F_{22} that is 2,

$h(n)$ is the cheapest cost from F_{22} to C_2 that is 2,

So, it is chosen the second path $f(n)=4$.

During the movement of A_i , C_2 receives more information about it from different base stations presented in the path. Based on this information, it can calculate the mobile user's velocity and its destination. If some interruption is presented in his path a notification message is sent to A_i .

4. <-PATH PREDICTION ALGORITHM

We propose a path prediction algorithm that is based on Mobile Motion Prediction algorithms [13,14], it predicts the future location of a mobile user according to his movement history pattern. The MMP algorithms are based on the fact that everyone has some degree of regularity in his/her movement that consists of a random and regular movement. While we speak about user that moves on urban

roads, some regularity in the user movement is due to the topology of the roads. The random movement is represented in the choices tacked on the minor roads. So, all the random movement on the urban roads can be reduced to regular movement.

Our work considers the user's movement only regular movement defined by the urban roads maps.

An important parameter used to express the regularity of the user's movement is called.

4.1 Degree of Regularity $D_R = N_s / N(1)$

D_R is an important parameter in our work; it helps in increasing the prediction accuracy. N_s is a counter that counts the number of states that matching on the path (the states are considered a well defined indications on the road).

N represents the total number of states considered to define the path with high precision. Generally, the description of a path between two nodes is described by a set of indications between the two points. The urban roads can be considered as a graph G with N nodes. Where nodes are indications on the path, and the links between such nodes are the urban roads, Figs. 6 and 7.

α -PPA maintains information about the previous movements of the user and this information is stored in an array multidimensional $N[i][j]$ (flowchart in Figs. 8 and 9 and is updated periodically given the information received from the base stations).

The information about the user (ID) is stored in a hash table. The user that travels on the same path each day has a regular movement and its destination can be predicted quickly. Generally, when people go to work, they follow the same path every day, the presence of interruption or accident on the path can create unexpected delay. Our system can help in minimizing the delay in such cases.

α -PPA works based on the information received from the base station that is (ID, V , α , T). Where ID indicates the user ID that can be his phone number or the number of his SIM card number. Local users can be identified quickly by the HLR (Home Location Register) data base stored in the MSC [5]. However, visited users need a registration during which is identified his phone number or his SIM card number. V indicates the user velocity calculated by the base station given two measurements in the same range. T is the time on which the user is located in a given location near the base station α define the direction.

The MSC recognizes the information received in only the following two states: new user or registered one. New user that means the ID is not presented in the hash table (referred ID=0 in the flowchart). And registered one means information about him has been received from another base station previously and this information is stored in a location in the hash table (ID=1 in the flowchart).

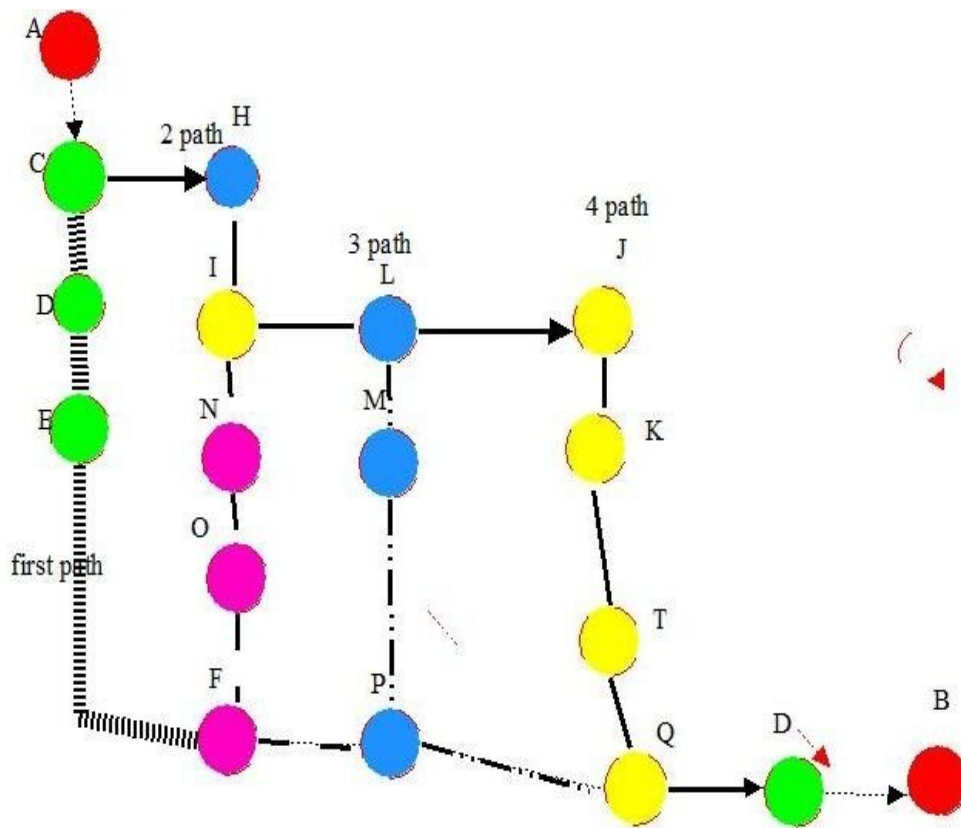


Fig. 6. Graph that represents the possible paths from Porta Lucca (pisa) to national

Notification:

- Each information received about one user, must occupy a location in the hash table denoted as X_i . n is the size of the hash table $i=0.....n$.
- $N_s[i]$ represent the states that match with the registered states, for each new matching state N_s is incremented by 1.
- β indicates the location of the mobile user, considering that the location of the base stations is fixed.

4.2 Algorithm Description

1. The algorithm starts by reading information (user ID) received from the base station. If $ID=0$ that means a new user (Visited one) and he haven't an information in hash table. So, $h(ID)$ is calculated to define its location in the hash table.

2. "Path Prediction Procedure".

Path Prediction Procedure.

3. At the beginning $N_s=0$.

4. Read indication (β). If the ($\beta = 0$) is a new one, store it in the $N[i][j]$ table. Increment the counter N_s by 1.

5. Step 4 is repeated until having a good information needed to define the path with high accuracy ($N_s \geq 4$). Then is calculated the degree of regular from equation 1.

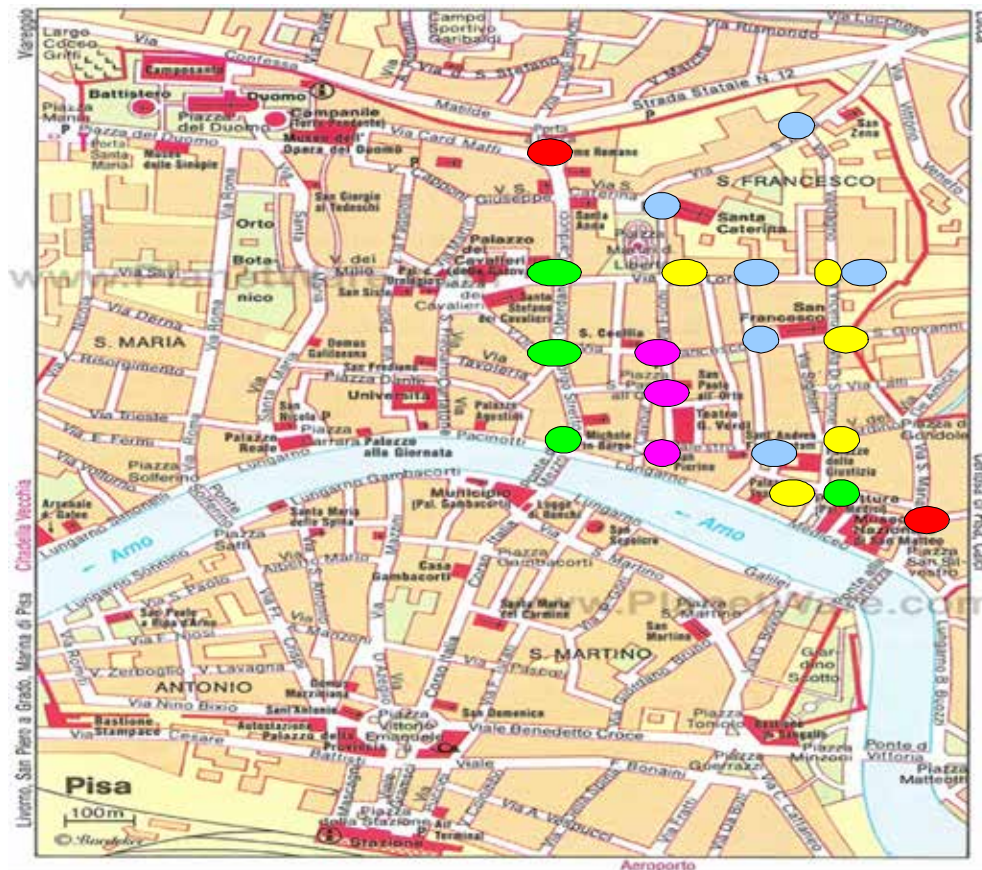


Fig. 7. Pisa (Italy) Map

6. If $D_R < 1$ the references are not sufficient, it needs more references and the algorithm turn to the step 4.

7. If $D_R=1$ the references are sufficient and the path can be predicted.

8. If $D_r > 1$ the references are sufficient and the path can be defined with high precision.

9. Turn to step 1.

4.3 Prediction Procedure

This procedure assigns a weight to each node that is the probability of state S to be accessed after $S-1$. Each time a prediction success, the probability is increased. If another user arrives at node $S-1$ the next step can be the node with high probability. For example, in Fig. 1, to go from source to destination (A to B), each node that takes the path A-C-H-I has two probabilities to continue with L-J path or N-F-O- path.

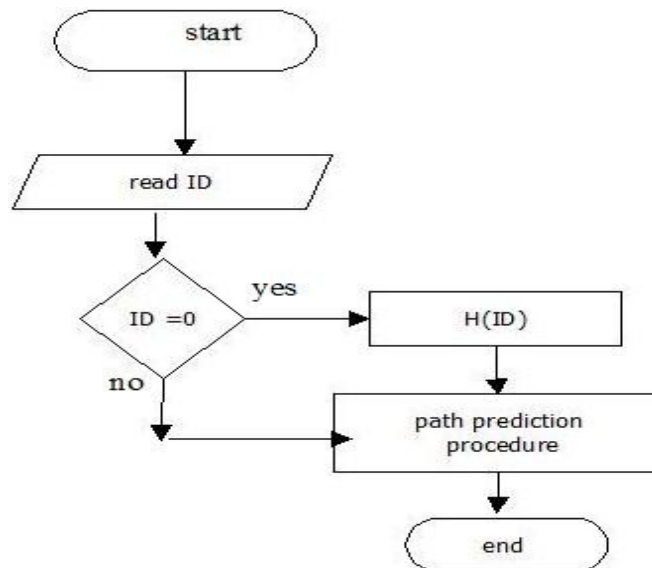


Fig. 8. Path prediction algorithm

To both L and N is assigned a probability counter that start from 0. If the user follows L, its counter is incremented by 1. When another user wants to go from A to B and passes on I, it is predicted with high probability that will follow L.

We have two tables: the first is the hash table that contains User ID and the predicted location.

$$H(ID) = 5key \text{ mod } m(2);$$

$H(ID)$ indicates the hash function used to determine the location in which is inserted the user; ID ;

M is the size of the table; Key is the SIM card number. It is used hash table because searching and insertion require $O(1)$.

When the prediction procedure end, the location predicted is inserted in the hash table to be used as reference in the next predictions.

The second table is the indications table that contains indications to be followed for each destination. It is $n*m$ table where n is the number of rows. T_{n1} (the first column in each row) must contain the location (destination) and in the other columns is inserted the indications that identify such destination. The following example explains how data is organized in our table and how prediction procedure works.

Example: considering we have the indication table as follow:

Table 1. Indication table

Destination	Indications							
A	X ₁	X ₂	Y ₁	Z ₁	X ₃	X ₄	Z ₂	Z ₄
B	Z ₄	Z ₃	Y ₂	X ₁	X ₂	Z ₁	Z ₂	Y ₃
C	Y ₁	Y ₂	Y ₃	Y ₄	Z ₁	X ₁	X ₂	Y ₂
D	X ₁	X ₂	Y ₂	Z ₂	Z ₃	Z ₄	Y ₄	Y ₃

Considering that the first indication referred about the user where X_1 that means the user maybe will reach one of the following destination: A, D or B, C (the counter of X_1 is incremented and is predicted the second indication that is X_2) this indication also matches in both destination A, D (the counter of X_2) is increased. We expect the third indication if the next indication is Y_1 so we can expect with high probability that the user destination will be A after the fourth indication the destination can be predicted correctly based on the indications stored in the previous indication table (highlighted cells indicate the predicted cells). If the third indication comes Y_2 the prediction will shifted to C and D so we wait the fourth indication to decide with high accuracy which destination the user will follow. However, if the third destination is Z_1 so it is followed the row of B for the indications.

Each time an indication is predicted correctly its counter is incremented by 1.

If the indication predicted in our example were B for example, this indication is added to the hash table in the row correspondent to the User ID.

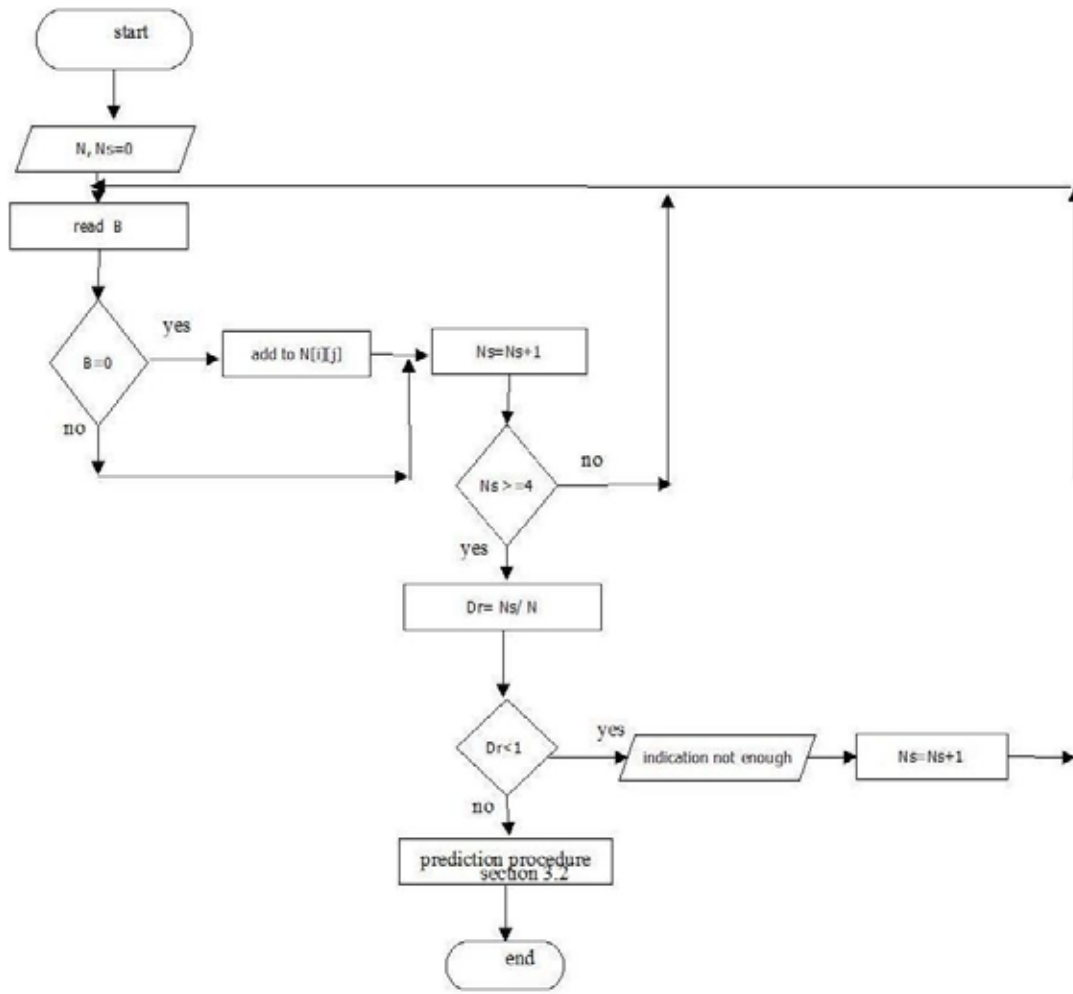


Fig. 9. Path prediction procedure

5. RESULTS

Prediction accuracy in our work is calculated based on prediction correctness that is the number of user predicted correctly to the number of user detected.

$$\text{Prediction correctness} = \frac{\text{the number of user predicted correctly}}{\text{the number of user detected}} \tag{2}$$

$$\text{And so prediction accuracy} = \frac{\text{prediction correctness}}{\text{the number of user in the network}} \tag{3}$$

Our goal is to reduce the number of cars that reach some point in the crowded cities or in the case of accident. If we obtain a prediction correctness in the interval 40-50% (that means as described in our algorithm (Fig. 9) only four indications predicted correctly can identify the path. In consequence for each 10 cars, four of them are predicted correctly) the prediction accuracy obtained by equation 3 vary

from 16% to 40%. And this result is a good results comparing it to that presented in [16] where the prediction accuracy is around 23%. Table 2, show our obtained results for prediction correctness up to 40-50%.

Table 2. Prediction accuracy results

# of user in the network	Prediction correctness 40%		Prediction correctness 50%	
	# of user predicted correctly	Prediction accuracy	# of user predicted correctly	Prediction accuracy
1000	200	20%	250	25%
	240	24%	300	30%
	280	28%	350	35%
	320	32%	400	40%
3000	600	20%	750	25%
	680	22%	850	28%
	800	26%	1000	33.3%
	920	30.6%	1150	38%
5000	800	16%	1000	20%
	1200	24%	1500	30%
	1400	28%	1750	35%
	1600	32%	2000	40%

6. RELATED WORKS

The major part of prediction algorithms for wireless networks make use of history base that has a record of the previous user movement. These algorithms take in consideration different factors such as the direction of movement, velocity. For that, regular movement can be predicted with high accuracy. In our work, user movement pattern is restricted to the road layout. For that some of previous algorithms can be useful in our work. For example, MMP (Mobile Motion Prediction) algorithm [15] and regular path recognition method [16] attempt to exploit regularity in human behavior in terms of periodic or repetitive activities. The performance of these algorithms is accurate with regular movement. However, in wireless ad-hoc networks prediction cannot be based only on past history due to dynamic topology. In [17], path prediction is considered based on the presence of link between any two mobile nodes. The authors calculate the velocity and predict the direction of motion based on link expiration time between any two nodes. Wand et al in [18], use group mobility model to predict the user movement pattern considering that velocity is not time variant in mobile ad-hoc network.

In [19], the movement pattern of mobile users is viewed in respect to the cluster that belong to it. Areas are divided into clusters and every node in the network belong to a cluster and the prediction process should be restricted to areas of high cluster

change probability. So, the location of the user id defined with respect to its position in the cluster. The cluster head has complete knowledge of each of its member nodes. Prediction accuracy is calculated by the following formula:

$$\text{prediction accuracy} = \frac{\sum \frac{\# \text{ of user executes cluster change}}{\# \text{ of predicted user cluster change}}}{\text{Total number of users in the network}}$$

In [20], a survey of vehicular mobility models is presented, where user movement is classified in four classes based on the method used to generate such movement. A comparison between different simulation methods used to illustrate relationship between network simulator and traffic generation and transportation infrastructure studied in a realistic mobility models. Realistic mobility model must take in consideration the realistic topological maps, acceleration and deceleration, obstacles, simulation time, random distribution of vehicles, intelligent driving pattern.

7. CONCLUSION AND FUTURE WORKS

In this paper, we proposed Virtual Explorer system that is a new system that detects the motion of the mobile user to be able to predict his destination.

Our system is an information system that provides the user information about the traffic on the major or minor roads to make him satisfied when travelling on such roads. We expect that our system will reduce the traffic in the congested points about 40-50%. Our results show that the prediction accuracy will vary from 20-40% and that is a good results considering our goal. Our future work is to implement our prediction algorithm to confirm our analytical results in addition we expect to develop our system to simulate a real mobile distributed system where the base station that collects and disseminates information is any car on the road.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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Computer modeling of electronics to external stimuli via ASONIKA system

Abstract: This article focuses on the methodology of computer modeling of electronics to external thermal, mechanical, electromagnetic effects. The publication discusses the scientific and practical aspects of computer electronics simulation using an automated system ASONIKA.

Keywords: modeling, radio-electronic means, ASONIKA, thermal processes, mechanical processes, electromagnetic processes.

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Компьютерное моделирование электроники на внешние воздействия с помощью системы АСОНИКА

Аннотация: Данная статья посвящена методологии компьютерного моделирования электроники на внешние тепловые, механические, электромагнитные воздействия. В публикации рассматриваются научные и практические аспекты компьютерного моделирования электроники с помощью автоматизированной системы АСОНИКА.

Ключевые слова: моделирование, радиоэлектронное средство, АСОНИКА, тепловые процессы, механические процессы, электромагнитные процессы.

Вся современная техника (ракеты, самолеты, танки, корабли, подводные лодки, автомобили) обязательно включает электронную аппаратуру, которая состоит из печатных плат, микросхем и др. И если одна из них не работает, то не функционирует вся техника.

Работу аппаратуры значительно ухудшают воздействия вибраций, ударов, тепла, электромагнитных полей, радиации и др. Поэтому важным этапом создания электронной аппаратуры являются ее испытания на все эти воздействия. Испытания обходятся очень дорого, требуют много времени и часто не позволяют правильно прогнозировать состояние электронной аппаратуры в реальных условиях, особенно в критических режимах.

В течение тридцати лет мы создавали и апробировали на многих российских предприятиях, прежде всего оборонной, космической и авиационной отраслей, технологию компьютерного моделирования электроники на внешние

воздействия. Суть этой технологии состоит в следующем: используя автоматизированную систему обеспечения надежности и качества аппаратуры (АСОНИКА), можно с помощью компьютера предвидеть и предотвращать всевозможные отказы еще не изготовленной электронной аппаратуры, предназначенной для функционирования на военных, космических и гражданских объектах [1]. И все это можно сделать в течение нескольких часов и очень наглядно.

Применение системы АСОНИКА обеспечивает автоматизированное проектирование сложных радиоэлектронных средств (РЭС) в условиях воздействия внешних дестабилизирующих факторов в соответствии с требованиями CALS-технологий на этапах проектирование–производство–эксплуатация и тем самым обеспечивает [2]:

- повышение качества проектирования сложных РЭС;
- исключение критических ошибок при проектировании сложных РЭС;
- сокращение времени и трудоемкости работ по проектированию сложных РЭС;
- достижение полного охвата всех этапов жизненного цикла продукции от маркетинговых исследований до утилизации в соответствии со стандартами CALS-технологий;
- учет наиболее полного спектра воздействующих факторов (механических, тепловых, электромагнитных, радиационных);
- снижение сроков и затрат на проектирование за счет доступности разработчику сложных РЭС предлагаемых программных средств и адекватности результатов моделирования.

Система АСОНИКА предназначена для решения четырех основных проблем, существующих при разработке современных РЭС:

- предотвращение возможных отказов при эксплуатации на ранних этапах проектирования за счет комплексного моделирования разнородных физических процессов;
- обеспечение безопасности человека при полетах на самолетах (предотвращения авиакатастроф) за счет комплексного автоматизированного анализа системы управления самолетом на основе созданной электронной модели при всех видах внешних дестабилизирующих факторах, в том числе в критических режимах;

- сокращение сроков и затрат на проектирование за счет доступности разработчику аппаратуры предлагаемых программных средств и адекватности результатов моделирования;

- автоматизация документооборота и создание электронной модели РЭС за счет интеграции предлагаемых программных средств в рамках PDM-системы хранения и управления инженерными данными и жизненным циклом аппаратуры.

Система АСОНИКА обеспечивает дополнение обычного перечня конструкторской документации результатами расчетов и моделями, по которым эти расчеты проведены. Тем самым формируется электронный виртуальный макет создаваемой аппаратуры, который может быть передан на этапы изготовления и эксплуатации. В рамках системы АСОНИКА реализуется специальный программный комплекс, который формирует структуру электронного (виртуального) макета разрабатываемой аппаратуры, наполняет данную структуру результатами работы проблемных подсистем системы АСОНИКА. Эти подсистемы позволяют моделировать электрические, тепловые, аэродинамические, механические и деградационные процессы в аппаратуре, осуществляют диагностическое моделирование, анализ показателей надежности, а также позволяют интегрироваться с системами топологического проектирования систем и устройств телекоммуникаций Mentor Graphics, Altium Designere, PCAD и др.

Программный комплекс управляет процессом отображения результатов модельных экспериментов на геометрической модели, входящей в состав электронного макета, а также преобразует электронный макет после его обработки в формат стандарта ISO 10303 STEP. Данные, входящие в электронный макет, используются на последующих стадиях жизненного цикла РЭС.

В настоящее время система АСОНИКА состоит из тринадцати подсистем:

- анализа типовых конструкций блоков РЭС на механические воздействия АСОНИКА-М;

- анализа типовых конструкций шкафов и стоек РЭС на механические воздействия АСОНИКА-М-ШКАФ;

- анализа и обеспечения стойкости произвольных объемных конструкций, созданных в системах ProEngineer, SolidWorks и других САО-системах в форматах IGES и SAT, к механическим воздействиям АСОНИКА-М-3D;

- анализа и обеспечения стойкости к механическим воздействиям конструкций РЭС, установленной на виброизоляторах, АСОНИКА-В;
- анализа и обеспечения тепловых характеристик конструкций аппаратуры АСОНИКА-Т;
- анализа конструкций печатных узлов РЭС на тепловые и механические воздействия АСОНИКА-ТМ;
- автоматизированного заполнения карт рабочих режимов электрорадиоизделий (ЭРИ) АСОНИКА-Р;
- анализа показателей надежности РЭС с учетом реальных режимов работы ЭРИ АСОНИКА-Б;
- справочная база данных электрорадиоизделий и материалов по геометрическим, физико-механическим, теплофизическим, электрическим и надежностным параметрам АСОНИКА-БД;
- идентификации физико-механических и теплофизических параметров моделей РЭС АСОНИКА-ИД;
- анализа усталостной прочности конструкций печатных плат и электрорадиоизделий при механических воздействиях АСОНИКА-УСТ;
- анализа и обеспечения электромагнитной совместимости РЭС АСОНИКА-ЭМС;
- управления моделированием РЭС при проектировании АСОНИКА-УМ.

Система АСОНИКА включает в себя следующие конверторы с известными САПР:

- модуль интеграции системы моделирования электрических процессов в схемах PSpice и подсистем АСОНИКА-Р, АСОНИКА-Б (ведется разработка модулей интеграции с системами Mentor Graphics и Altium Designere);
- модуль интеграции систем проектирования печатных узлов PCAD, Mentor Graphics, Altium Designere и подсистемы АСОНИКА-ТМ;
- модуль интеграции 3D модели, созданной в системах КОМПАС, ProEngineer, SolidWorks, Inventor, T-FLEX в форматах IGES, SAT и подсистемы АСОНИКА-М (версия АСОНИКА-М-3D).

Структура автоматизированной системы АСОНИКА (рис. 1) предусматривает, что в процессе проектирования, в соответствии с требованиями CALS-технологий, на базе подсистемы управления данными при моделировании

АСОНИКА-УМ (PDM-системы) и с использованием подсистем моделирования происходит формирование электронной модели изделия.

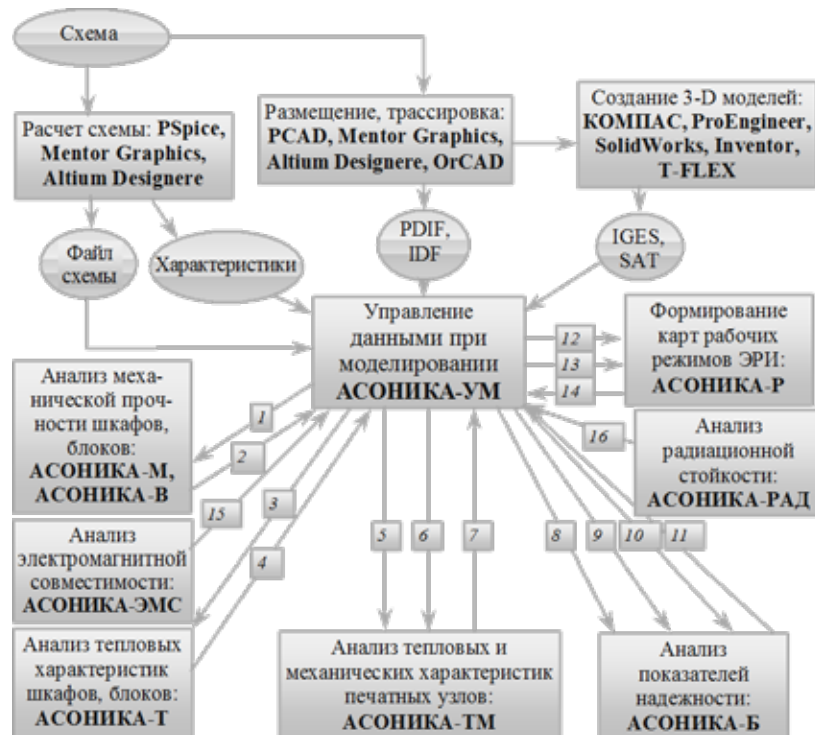


Рис. 1. Структура автоматизированной системы АСОНИКА

С помощью специального графического редактора вводится электрическая схема, которая сохраняется в базе данных проектов в подсистеме АСОНИКА-УМ и передается в виде файла в системы анализа электрических схем PSpice, Mentor Graphics и Altium Designere, а также в системы размещения и трассировки печатных плат PCAD, Mentor Graphics и Altium Designere. Выходные файлы системы PCAD в формате PDF и Mentor Graphics и Altium Designere в формате IDF либо сохраняются в подсистеме АСОНИКА-УМ, либо направляются в системы AUTOCAD, КОМПАС, ProEngineer, SolidWorks, Inventor, T-FLEX для создания чертежей и опять-таки сохраняются в подсистеме АСОНИКА-УМ. В подсистему АСОНИКА-УМ также передаются 3-D модели шкафов и блоков РЭС, созданные в системах КОМПАС, ProEngineer, SolidWorks, Inventor, T-FLEX в форматах IGES и SAT, которые из нее направляются в подсистемы АСОНИКА-М и АСОНИКА-В (1) для анализа механических процессов в шкафах и блоках

РЭС, а также в подсистему АСОНИКА-Т (3) для анализа тепловых процессов в шкафах и блоках РЭС.

Полученные в результате моделирования напряжения, перемещения, ускорения и температуры в конструкциях шкафов и блоков сохраняются в подсистеме АСОНИКА-УМ (2, 4). Чертежи печатных узлов (ПУ) и спецификации к ним, а также файлы в форматах PDF и IDF передаются из подсистемы АСОНИКА-УМ в подсистему АСОНИКА-ТМ (5) для комплексного анализа тепловых и механических процессов в ПУ. Кроме того, передаются температуры воздуха в узлах, полученные в подсистеме АСОНИКА-Т, а также ускорения опор, полученные в подсистеме АСОНИКА-М (6). Полученные в результате моделирования температуры и ускорения ЭРИ сохраняются в подсистеме АСОНИКА-УМ (7).

Перечень ЭРИ (8), файлы с электрическими характеристиками ЭРИ (9), температурами и ускорениями ЭРИ (10), результаты электромагнитного (15) и радиационного (16) анализа, полученные в подсистемах АСОНИКА-ЭМС и АСОНИКА-РАД, передаются из подсистемы АСОНИКА-УМ в подсистему анализа показателей надежности РЭС АСОНИКА-Б. Полученные в результате показатели надежности РЭС сохраняются в подсистеме АСОНИКА-УМ (11). Перечень ЭРИ, файлы с электрическими характеристиками ЭРИ (12), температурами и ускорениями ЭРИ (13) передаются из подсистемы АСОНИКА-УМ в подсистему формирования карт рабочих режимов ЭРИ АСОНИКА-Р. Полученные в результате карты рабочих режимов сохраняются в подсистеме АСОНИКА-УМ (14).

Система ориентирована на разработчика РЭС. С этой целью созданы специальные интерфейсы для ввода типовых конструкций аппаратуры – шкафов, блоков, печатных узлов, что значительно упрощает анализ физических процессов в РЭС.

Реализация описанной интеграции положила начало развитию и внедрению CALS-технологий на предприятиях радиоэлектронной и приборостроительной отраслей. Интеграция программных продуктов позволяет выполнить сквозное автоматизированное проектирование РЭС на основе комплексного моделирования физических процессов. Язык интерфейса пользователя с программами максимально приближен к языку разработчика РЭС. На освоение предлагаемых программ требуется сравнительно малое время. При их внедрении до-

стигается достаточно высокая скорость решения задач моделирования и значительная экономия материальных средств за счет сокращения количества испытаний. Повышается надежность и качество РЭС, проектируемой на основе предлагаемой интегрированной САПР.

Целью внедрения системы АСОНИКА является повышение эффективности работы структурных подразделений предприятия, приведение их в соответствие с современными мировыми и отечественными стандартами качества, сокращение сроков проектирования и разработки наукоемких РЭС, повышение надежности разрабатываемых РЭС.

Список литературы:

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Factors of Ribbon Lengthiness of Outspread Straw and Losses of Fiber Flax Seeds from Stem Underdeseeding while Combine Harvesting

Abstract: Ribbon lengthiness of outspread straw, with the help of flax combine, is considered to be an indicator that defines the patency and conditions of the use of machine aggregates in the preparation and gathering of dew-retted flax straw. The influence of the combine aggregates speed and pulling height of fiber flax on stem lengthiness in ribbon and on changes in losses of fiber flax seeds from the stem underdeseeding with taking into account its stretching was shown.

Keywords: fiber flax, harvesting, straw ribbon, lengthiness, combine, use.

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Фактори розтягнутості стрічки розстеленої соломи і втрати насіння від недоочісування стебел льону- довгунця при збиранні комбайном

Анотація: Розтягнутість стрічки розстеленої льонозбиральним комбайном соломи розглянуто як показник, що визначає прохідність і умови використання машинних агрегатів при готуванні і збиранні рошенцевої льонотрести. З'ясовано вплив швидкості руху комбайнового агрегату і висоти брання льону-довгунця на розтягнутість стебел в стрічці та зміну втрат насіння льону-довгунця від недоочісування стебел з урахуванням їх розтягнутості.

Ключові слова: льон-довгунець, збирання, стрічка соломи, розтягнутість, комбайн, використання.

Виробництво рошенцевої льонотрести включає низку технологічних операцій з її готування, піднімання з поля виготовленої льоносировини, формування відповідних упаковок цієї сировини, навантажування упаковок в транспортні засоби та транспортування до місць зберігання чи переробки трести. Готування трести розпочинають з брання льону-довгунця, очісування стебел соломи в стрічку для вилежування (перетворення) в тресту. За комбайнового збирання перераховані операції виконує комбайн. Для уникнення підгнивання нижнього шару стебел в розстеленій стрічці соломи і поліпшення протікання мікробіологічних процесів, що зумовлюють і супроводжують процес вилежування соломи і перетворення її в тресту, стрічку за допомогою відповідних засобів механізації відривають від поверхні поля, ворухать, зпушують і перевертають. Для підвищення продуктивності засобів механізації піднімання і формування упаковок трести стрічки подвоюють шляхом накладання однієї на іншу за допомогою відповідних машин.

Розстелені комбайном стрічки не повинні накладатися одна на іншу, тобто на гузирі стебел попередньо розстеленої стрічки не мають бути накладені верхівки стебел чергової розстелюваної стрічки. Між стрічками повинен залишатися відповідний інтервал, що дозволяє виконувати наступні механізовані операції, які передбачені технологією виробництва рошенцевої льонотрести. За даними А. А. Ярошевича (1967) цей інтервал має становити 0,1 м, а за інформацією А. В. Писарчика (1970) бути в межах 0,1...0,15 м. Із збільшенням розтягнутості стрічки інтервал між ними з урахуванням ширини захвату комбайна зменшується, що, крім іншого, викликає зміну щільності розстеленої соломи на льонищі (А. А. Ярошевич, 1967; И. И. Пиуновский и др., 1969; А. В. Писарчик, 1970), а, отже, використання його площі та супроводжується зміною довжини розстеленої стрічки на одному гектарі поля (А. В. Писарчик, 1970). В проблемі механізованого виробництва трести поки що залишилася ще нез'ясованою низка питань, про деякі з них і буде йти мова в цьому повідомленні і зокрема про формування розтягнутості стебел в розстеленій комбайном стрічці льоносоломи.

Розтягнутістю стебел в розстеленій стрічці соломи льону-довгунця (розтягнутість стрічки) при використанні льонозбиральних машин цікавилися М. Н. Летошнєв (1955) і А. С. Маят (1969). Це питання вивчали М. І. Кльонін (1980), М. Н. Биков (1969), А. Ю. Горбовий (2007), О. О. Налобіна (2008), Н. А. Смірнов (1974), Г. А. Хайліс і В. О. Шейченко (2006) та ін. Визначено, що

розтягнутість стебел залежить від висоти брання, швидкості руху збирального агрегату, ширини захвату секцій брального механізму та інших конструктивних параметрів і режимів використання льонозбиральних машин та комбайнів зокрема. Із збільшення висоти брання ярусного і короткого льону розтягнутість стрічки зростає, а при збиранні вирівняного довгостеблового – зменшується [1]. За [2] щоб зменшити розтягнутість стрічки висоту брання призначають за можливості більшою для відповідного стеблостою, але з урахуванням чистоти очісування. За даними [1] на висоті брання 250 мм з підвищення швидкості руху комбайна до 6,24 км/год розтягнутість стрічки зменшувалася, а з подальшим підвищенням до 13,6 км/год – зростала. При цьому чистота очісування при підвищенні швидкості руху від 1,64 до 13,6 км/год покращувалася.

Дослідження Н. А. Смірнова [3] показали, що при транспортуванні вибраних стебел поперечним транспортером комбайна внаслідок різних швидкостей руху віток транспортера та послідовного поступання на нього стебел, що вибрані різними бральними секціями, відбувається подальше збільшення розтягнутості стебел. При очісуванні стебел, які знаходяться в проміжку між пасами затискного конвеєра, внаслідок дії зубів гребеня очісувального барабана можливе висмикування стебел із вказаного проміжку [4], що викликатиме відносне зміщення стебел і зміну їх розтягнутості.

За [5] «... менше розтягування стебел у стрічці ... є сприятливою передумовою для роботи обертачів та підбирачів трести» (с. 16). Збільшення розтягнутості стрічки при використанні обертачів за агротехнічними вимогами не повинно перевищувати 5 %. При використанні обертачів ОСН-1 розтягнутість зростає до 1,9 %, ОСН-1А – на 1,0 ... 3,0 %, а ОЛП-1 – до 1,3 %. Застосування ворушарок ВЛ-2 на ворушінні стрічок спричинює збільшення їх розтягнутості на 6,0 %. При використанні ворушарок ВАТ «Львівагромашпроект» ВРЛ-3 збільшення розтягнутості стрічок не виявлено. Випробування навісного подвоювача стрічок льону СД-2 показали, що при його використанні розтягнутість стрічок при їх обертанні зростає на 2,9...3,8 %, при подвоюванні - 17,7...18,3 %, а потроюванні – на 22,1...28,8 %.

Враховуючи висловлене, бажано з'ясувати розтягнутість стрічки розстеленої соломи за умов збирання вирівняного стеблостою та найбільш доцільної висоти стебел льону-довгунця, що зумовлені особливостями використання льо-

нозбиральних машин, технологіями готування і збирання та первинної обробки льонотрести.

Мета дослідження полягала у підвищенні ефективності використання льонозбиральних комбайнів на розстиланні вибраних і очісаних ними стебел льону-довгунця для виробництва рошенцевої льонотрести. Завдання дослідження – визначити вплив швидкості руху льонозбирального комбайнового агрегату і висоти брання комбайном льону-довгунця на розтягнутість стебел в розстеленій стрічці льоносолами та з'ясувати зміну втрат насіння льону-довгунця залежно від розтягнутості стрічки. Досліджували використання агрегату у складі трактора класу 1,4 і комбайна ЛК-4Т. Дослідження проводили на швидкості руху агрегату 6,2 км/год, 9,4 і 12,6 км/год за висоти брання 200 мм та 265 і 330 мм.

Визначення розтягнутості стрічки (стебел в ній), втрат насіння від недоочісування, урожайності насіння і соломи, густоти стеблостою перед збиранням та висоти стебел здійснені за методиками колишнього Всесоюзного науково-дослідного інституту льону. Результати цих визначень наведені раніше [6]. Нагадаємо, що середня арифметична густина стеблостою перед збиранням льону-довгунця становила 1450 шт/м², а висота стебел змінювалася від 630 до 780 мм за середнього арифметичного значення 700 мм і коефіцієнта варіації 4,7 %. Середнє арифметичне значення вирівняності стеблостою перед збиранням становило 92 %, а її коефіцієнт варіації дорівнював тільки 2 %. Істотність різниці середніх арифметичних значень розтягнутості стрічки по варіантах дослідження визначали обчисленням найменшої істотної різниці та розрахунком *t*-критерію Стьюдента. Відносна точність визначення розтягнутості коливалася а межах 0,49...0,64 %. Найменша істотна різниця між середніми значеннями втрат насіння від недоочісування за варіантами дослідження для 5 %-го рівня значущості становила 1,72 %.

На швидкості 6,2 км/год за висоти брання 200 мм та 265 і 330 мм розтягнутість стрічки становила відповідно 1,26 та 1,25 і 1,19 разів. З підвищенням швидкості руху комбайна до 9,4 км/год за вказаної вище висоти брання розтягнутість стрічки зростає на 0,03 раза і становить на висоті брання 200 мм 1,29 раза, а на висоті брання 265 і 330 мм відповідно 1,28 і 1,22 раза. На швидкості руху 12,6 км/год за висоти брання 200 мм та 265 і 330 мм розтягнутість стрічки становила відповідно 1,24 та 1,22 і 1,30 раза, тобто на вказаній швидкості зміна розтягнутості стрічки залежно від висоти брання описується увігнутою параболо-

люю. На швидкостях руху 6,2 і 9,4 км/год зміна розтягнутості стрічки залежно від висоти брання відбувається за випуклими параболою другого порядку.

Із збільшенням розтягнутості стебел втрати насіння від недоочісування зростають. З'ясовано, що ці втрати зростають за прямолінійними залежностями і збільшуються із збільшенням висоти брання. За висоти брання 200 мм при розтягнутості стебел 1,24 втрати насіння від недоочісування становили 1,34 %, а при розтягнутості 1,29 – 2,02 %. Якщо встановити висоту брання льону комбайном 265 мм, то при розтягнутості стебел 1,22 втрати насіння від їх недоочісування становили 1,65 %, а при розтягнутості стебел 1,28 дорівнювали 3,34 %. Із збільшенням висоти брання до 330 мм при розтягнутості стебел 1,19 втрати насіння від недоочісування становили 2,90 %, а при розтягнутості стебел 1,30 – зростали до 6,66 %. Найбільш виразно і чітко прямолінійний характер зростання втрат насіння від недоочісування стебел із збільшенням їх розтягнутості спостерігається за висоти брання 330 мм. Апроксимація експериментальних значень втрат насіння на такому режимі використання комбайна рівнянням прямої з додатним кутовим коефіцієнтом засвідчила, що R^2 -коефіцієнт дорівнював 0,859. При цьому за значенням кутового коефіцієнта рівняння регресії при збільшенні розтягнутості стебел на 0,1 в досліджуваних межах її зміни втрати насіння зростають на 3,1 %. Найменші втрати насіння (0,56 і 1,34 %) спостерігаються на швидкості руху агрегату 6,2 і 1,26 км/год та висоті брання 200 мм. За втратами насіння не варто брати льон-довгунець на висоті 330 мм у всьому діапазоні досліджуваних швидкостей руху. Чим вище беруть льон-довгунець, тим менша довжина верхівкової частини стебел зазнає очісування і навпаки – чим нижче беруть льон, тим значніша довжина стебел потрапляє під дію зубів гребеня очісувального барабана. Від зміни висоти брання залежить висота затиску стебел в проміжку між пасами затискного конвеєра, а, отже, і довжина верхівкової частини стебел, яка зазнає дії зубів гребеня очісувального барабана [1, 7], викликаючи зміни втрат насіння від недоочісування.

Висновки. Розтягнутість стебел в розстеленій стрічці соломи залежно від швидкості руху комбайна за висоти брання 200 і 265 мм та висоти брання на швидкостях руху 6,2 і 9,4 км/год змінюється за випуклою параболою другого порядку. За висоти брання 330 мм залежно від швидкості руху комбайна та за швидкості руху комбайна 12,6 км/год залежно від висоти брання розтягнутість стебел у першому випадку прискорено зростає за параболічною кривою, а у

другому – описується увігнутою параболою другого порядку. Мінімальна розтягнутість стебел характерна використанню комбайнів на швидкості руху 6,2 км/год та висоті брання 330 мм. При роботі на підвищених швидкостях 9,4 і 12,6 км/год для забезпечення меншої розтягнутості стебел висоту брання слід зменшувати до 265 мм. За втратами насіння не варто вибирати льон-довгунець на висоті брання 330 мм в діапазоні зміни швидкості руху комбайнового агрегату від 6,2 до 12,6 км/год.

Напрямок подальших розвідок на нашу думку слід зосередити на пошуку умов технологізації режимних і регульовальних параметрів машинних агрегатів на готуванні і збиранні рошенцевої льонотрести.

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Adaptive control of gas-lift wells on investigations

Abstract: The article presents conception and structure of adaptive control of gas-lift wells on investigations. It also submits key creation principle of identifier. Basic development principle of system presented. Advantage and realization way is shown.

Keywords: gas-lift wells, identifier, parabolic dependency, statistical identification, adaptive control.

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Адаптивное управление газлифтными скважинами при исследованиях

Аннотация: В статье представлена концепция и структура адаптивного управления и контроля газлифтными скважинами при исследованиях. Рассмотрен принцип построения идентификатора для данной системы. Приведены основные принципы построения, показаны преимущества и пути реализации системы.

Ключевые слова: газлифтная скважина, идентификатор, параболическая зависимость, статистическая идентификация, адаптивный контроль и управление.

Газлифтный способ эксплуатации нефтяных скважин наиболее распространенный способ после фонтанной эксплуатации, ввиду простоты реализации и эффективности управления. При этом идентификация математической модели, используемой при оптимальном управлении скважинами – параболической зависимости $Q = f(V)$, где Q - дебит жидкости, V - расход рабочего агента (газа или воздуха), производится на основе экспериментальных исследований (рис. 1).

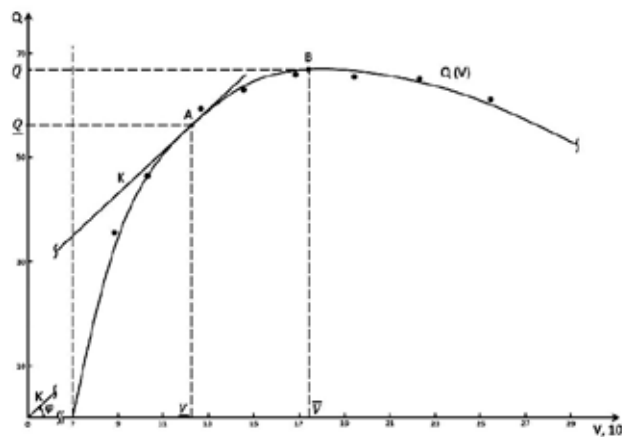


Рис. 1. Зависимость дебита от расхода рабочего агента

Однако в некоторых случаях проводить активные эксперименты в скважинах не представляется возможным из-за критичности их состояния к изменениям режимов работы, в результате которых скважина может захлебнуться (если значение расхода рабочего агента будет значительно ниже чем значение в оптимальном режиме) или перейти в пульсирующий (опасный) режим (вследствие подачи значительно большего количества рабочего агента чем в режиме максимального дебита). В обоих случаях добыча жидкости может прекратиться. Это делает настоятельными вопросы идентификации по данным нормального функционирования. Подход, изложенный в /1/, основан на статистической идентификации, алгоритм которого разработан исходя из корреляционных и автокорреляционных функций дебита и расхода. При этом точность идентификации не высока, погрешность определения коэффициентов параболической зависимости иногда достигает 15%. Отметим, что высокая погрешность обусловлена тем, что для идентификации используется не логарифмически-параболическая модель, которая более адекватна процессу газлифтной добычи нефти, а обыч-

ная параболическая модель. Это связано со сглаживанием при логарифмировании информации в результатах измерения в нормальном режиме эксплуатации. Необходимо отметить, что снижения погрешности идентификации можно добиться грамотным выбором интервала наблюдения за процессом добычи, стационарность которого может охватить достаточно широкий временной диапазон - до 1,5-2 месяца, а также отбраковкой аномальных результатов измерения, связанных как с помехами при измерениях, так и изменением режимов работы при случайных (аварийных) изменениях объемов рабочего агента.

Несмотря на это, анализ результатов обработки результатов измерения при экспериментальных исследованиях скважин (активных экспериментов) и данных их нормального функционирования (пассивных экспериментов) показывает, что при указанных выше обстоятельствах, когда проведение активных экспериментов в скважинах в условиях неопределенности не представляется возможным, результаты статистической идентификации могут быть использованы для корректирования, а при более благоприятных результатах обработки, для планирования экспериментов, адаптации и коррекции управления и контроля скважинами. При этом статистическая идентификация должна осуществляться непрерывно с проверкой адекватности процессу добычи в данной скважине.

В соответствии с данным подходом и концепции проведения экспериментальных исследований структуру адаптивного управления и контроля процессом исследований газлифтных скважин можно представить в следующем виде (рис. 2).

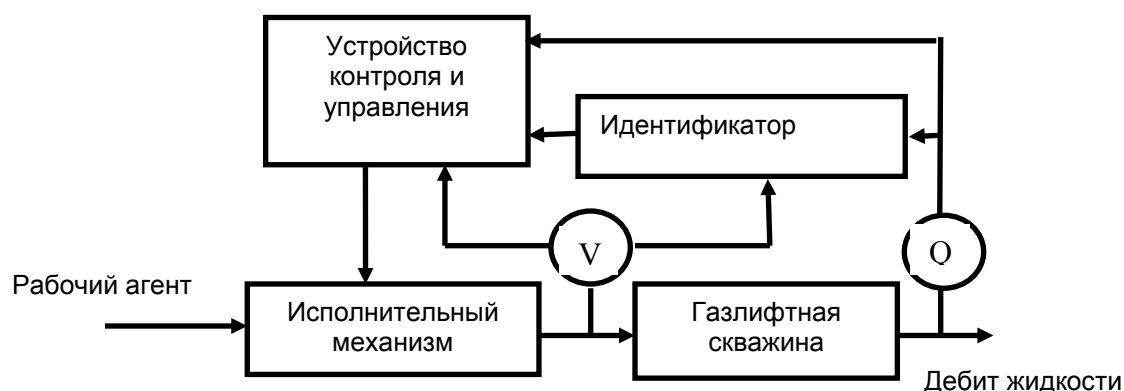


Рис. 2. Структура системы управления и контроля газлифтными скважинами с идентификатором

Согласно концепции исследований скважин путем проведения активных и пассивных экспериментов, принцип работы данной системы основан на получении дополнительной недостающей информации о возможных пределах изменения расхода рабочего агента в скважине, критичной к активным экспериментам, путем проведения пассивных экспериментов в режиме нормального функционирования. Таким образом, результаты пассивного эксперимента (нормального функционирования) периодически обрабатываются идентификатором, осуществляется идентификация зависимости $Q=f(V)$, определяются коэффициенты математической модели и приблизительные значения оптимального и максимального режимов работы скважины. Причем идентификация осуществляется не традиционным методом наименьших квадратов, а путем решения задачи минимизации суммы квадратов корреляционных и автокорреляционных функций дебита жидкости и расхода рабочего агента с ограничениями для правильной интерпретации результатов идентификации, т.е. для предотвращения получения результатов, не отражающих сущность математической модели. В ограничения включены знаки соответствующих коэффициентов параболы и отношение значений оптимального и максимального расходов рабочего агента, которое во всех случаях должно быть больше единицы.

Как показывают предварительные расчеты, наличие идентификатора позволит в автоматическом режиме следить за изменениями характеристики скважины и своевременно корректировать режимы работы скважин.

Реализация структур управления и контроля подобного типа в настоящее время не представляет большой сложности ввиду наличия большого количества разнотипных программируемых логических контроллеров с повышенными функциональными возможностями [2]. При этом данная система может быть подключена также к скважинам, в которых активные экспериментальные исследования разрешены.

Таким образом, наличие идентификатора в составе системы превращает систему управления и контроля исследованиями в скважинах в адаптивную систему, вследствие чего повышаются надежность и достоверность управления, появляется возможность применения более гибкой стратегии экспериментальных исследований, что способствует повышению эффективности проведения исследований, путем снижения непроизводительных потерь.

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Damages determination device use of a pulse scatterometry method

Abstract: Article is devoted to questions of automatic detection of cable lines damages on the cable lines non-uniformity serial measuring P5-8/2 instrument base. Entered into structure of this device the generator of saw tooth tension allows to measure non- uniformity of cables with digital registration.

Keywords: pulse method. cable lines, saw tooth, damages, structure.

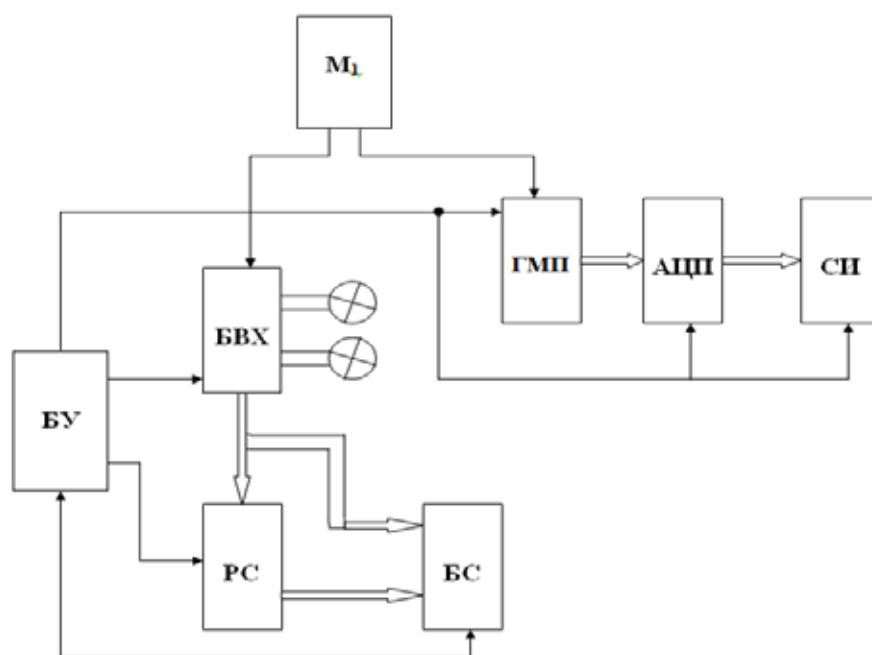
Устройства определения неисправностей кабельных линий с использования метода импульсной рефлектометрии

Исследование методов обнаружения неисправностей кабельных линий связи (к/л/с) показывает, что наиболее эффективным методом из них для разработки аппаратуры контроля кабельных линий является импульсный метод рефлектометрии [1]. На основе указанного метода разработаны множество устройств контроля, отличающихся разными подходами к выявлению амплитуды и времени фиксации отраженного от мест повреждения импульса (ОИ).

Учитывая вышеизложенное и принципы работ российских приборов типа P5 была разработана функциональная схема устройства для результатов измерений и автоматической подстройкой шкалы расстояния до места определения неоднородностей к/л/с с цифровой регистрацией повреждения на базе серийного измерителя неоднородностей типа P5-8/2.

Измеритель неоднородностей линии P5-8/2 состоит из следующих функциональных узлов: 1 - тактовый генератор (блок питания); 2 - схема управления; 3 - зарядное устройства; 4 - калибратор; 5 - устройства зарядное и записи; 6- генератор пилообразного напряжения (ГПН); 7 - схема задержки ЗИ; 8 - делитель на два; 9 - генератор ЗИ; 10 - схема задержки ИИ; 11 - генератор

ИИ 1; 12 - модулятор 1; 13 - усилитель индикатора; 14 - модулятор 2; 15 - усилитель-расширитель; 16 - временной селектор; 17 - генератор ИИ 2; 18 - интегратор 2; 20 – компенсатор 1; 21 - временной селектор 2; 22 - компенсатор 2; 21 - сумматор; 24 - блок определения коэффициента отражения [1].



**Функциональная схема устройства контроля неисправностей
кабельных линий**

Принцип работы устройства основан на автоматической подстройке опорного напряжения которого сравниваясь с напряжением генератора пилообразного напряжения (ГПН) 6 серийного измерителя неоднородностей Р5-8/2 с помощью схемы задержки (10) того же прибора обеспечивает автоматическую подстройку ΔU , соответствующую максимальному отклонению стрелки индикатора серийного измерителя неоднородностей линии типа Р5-8/2.

Разработанная схема с учетом использование соответствующих блоков измерителя неоднородностей линии типа Р5-8/2 работает следующим образом; напряжение ΔU получаемое в результате смешения опорного напряжения и пересечения его с напряжением ГПН и снимаемое со схемы Р5-8/2 (с клемм индикаторного прибора) подается на вход индексного сумматора, после чего вход аналого-цифрового преобразователя АЦП который в свою очередь через

блок управления БУ подключен к реверсивному счетчику. По указанной цепи осуществляется суммирование значений поступающих ΔU и их сравнение с каждым предыдущим значением.

По достижении ΔU максимального значения ΔU_{\max} по сигналу поступившему с реверсивного счетчика, блок управления (БУ) подключает к АЦП генератор медленно-изменяющегося пилообразного напряжения (ГМПН). Выход ГМПН подключен к входу схемы задержки измерительного импульса прибора Р5-8/2 (вместо потенциометра ручки «расстояние»), на схеме R 171 /1/.

В момент соответствующий максимальному значению ΔU_{\max} напряжение ГМПН сравнивается с напряжением ГПН приборов Р5-8/2 и запускает генератор измерительных импульсов (ГИИ) 11 с задержкой, соответствующей задержке отраженного импульса, которая в свою очередь пропорциональна измеряемому расстоянию до неоднородности. После преобразования информация об измеренном расстоянии, записывается в счетчик. Одновременно в счетчике блока сравнение заранее формируется цифровой код, соответствующие длине (расстоянию) каждой секции кабеля, разъема которых принимаются за источники создания неоднородностей, информации об измеренном расстоянии до неоднородности сравнивается с информацией счетчика блока сравнения. При соответствии этих кодов схема продолжает поисковую работу, и информация со счетчика не вводится на индикатор. При несоответствии кодов счетчик подключается к индикатору и после регистрации информации БУ переключает устройство с помощью коммутатора на другую проверяемую линию.

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Infectious-like Spread of an Agent Leading to Increased Medical Admissions and Deaths in Wigan (England), during 2011 and 2012

ABBREVIATIONS

CI: Confidence Interval; CMV: Cytomegalovirus, an immune modulating herpes virus; ED: Emergency Department; ICD-10: International Classification of Disease, 10th revision; LA: Local Authority; NHS: National Health Service; MSOA: Mid Super Output Area, a collection of OAs containing around 5,000 population; OA: Output area, smallest area to which Census data is aggregated, with around 500 population; ONS: Office for National Statistics.

1. INTRODUCTION

The Wrightington, Wigan & Leigh NHS Foundation Trust (the Trust) is a medium sized acute hospital situated in the town of Wigan on the outskirts of Greater Manchester, England. Over 90% of medical admissions are for residents of the Wigan Local Authority (LA). In common with many other parts of the UK during 2012, it experienced an unexpected and unexplained increase in Emergency Department (ED) attendances, medical emergency admissions and consequent bed pressures which coincided with an unexpected and unexplained increase in deaths across England and Wales lasting for around 18 months [1-2]. This was a repeat of similar unexplained increases in deaths which peaked in 2003 and 2008 [3]. On all three occasions deaths showed distinct spatiotemporal spread across the whole of the UK [4-6] and are highly age, gender and condition specific [7-9]. While the peaks in death are the same magnitude as a *large* influenza epidemic, unusual levels of influenza were absent and no adequate explanation has ever been given.

In 2010, a report by the Nuffield Trust [10] had suggested that such increases may partly be due to a lowering of the acute threshold to admission especially for very short stay admissions. The increase in short stay admissions in England coincided with the introduction of the 4 hour target for ED waiting time in 2001 and

involved the convergence of two developments. The first was the introduction of specialist assessment units in pediatrics, surgery and medicine where patients were admitted directly into a focused assessment and treatment environment that was part of emerging good practice. These developments collided with the introduction of the 4 hour target where, in some instances, it became easier to admit patients to assessment units to avoid breaching the target [11-14]. Hence the trend in same day stay 'admissions identified in the Nuffield Trust report were not deliberate acts of lowering the acute threshold *per se* but rather due to the difficulty of aligning the NHS data definitions and the HRG tariff during a period of rapid change [15-16]. However, while such factors distort the national picture, at a local level they become less significant as soon as a relative stable admission process is in place, and this was the case in the Trust at the time of this analysis.

Other analysis of the trends in emergency admissions has determined that such sudden and unexpected increases have occurred previously, and are specific to the medical specialties. They are marked by a set of diagnoses which appear to be immune sensitive, increase with age, have a degree of gender specificity, occur simultaneously with an increase in deaths, GP referral, ED attendance (along with a sudden change in arriving case-mix) and medical bed demand, and occur across the whole of the UK and in other Western countries [17-38]. More curiously they are also associated with a cycle in the gender ratio at birth [39]. Recent reviews of the available studies have suggested that these events could be due to infectious outbreaks involving the herpes virus, cytomegalovirus (CMV). This virus has a formidable array of powerful immune modifying strategies which have been implicated in autoimmune diseases, cardiovascular disease, certain cancers, hospitalization and death [see reviews 40-42].

With respect to the observed trends, it has been noted that deaths in England and Wales unexpectedly increased around February of 2012 and continued at this higher level to around June 2013 after which they reverted back to the more usual levels [1-3]. This increase did however show high granularity with East Cambridgeshire (East of England) showing a 14% reduction (2012 vs 2011) through to a 21% increase in Bromsgrove (West Midlands) [2]. The position with respect to an increase in all-cause mortality in Wigan and surrounding LA s is given in Table 1 and suggests that Wigan and several (but not all) adjacent LA s were a local 'hot

spot, especially for the 80+ age group, i.e. where the infectious-like event had an early rather than later initiation [2-3].

Table 1. Change in deaths between 2011 and 2012 calendar years in Wigan and surrounding Local Authorities

Local authority	Age 65+	Age 80+
Warrington	10%	13%
Chorley	4%	12%
Manchester	4%	10%
Wigan	8%	8%
Salford	7%	7%
Blackburn with Darwen	7%	7%
St Helens	5%	5%
West Lancashire	-2%	4%
Bolton	4%	0%
South Ribble	-2%	-2%

In England, census and other data are aggregated at output area (OA) level. Each OA contains roughly 500 head of population of the same social group and is then aggregated up to progressively larger geographies. Aggregation to what is called a Mid Super Output Area (MSOA), which contains around 5,000 head of population, has sufficient emergency medical admissions to conduct statistically robust analysis of trends over long time periods. In an attempt to resolve the issue as to whether we are dealing with a hospital admission threshold phenomena or a new type of infectious outbreak, this study will investigate the timing and extent of increase in emergency medical admissions within the hospital catchment population at MSOA level over the period 2011 to 2013. This is an extension of previous work analyzing small area infectious-like spread following the 2008 event in the North East Essex area of England [43].

2. MATERIALS AND METHODS

Monthly counts of deaths (all-cause mortality) from January 2006 to February 2014 for the residents of the Wigan Local Authority area were obtained from the Office for National Statistics (ONS). Daily data for emergency admission to the assessment unit and to the medical group of specialties (general and elderly medicine, gastroenterology, hematology, rheumatology, oncology, respiratory medicine, nephrology, endocrinology, rehabilitation), were obtained as part of a review of medical bed requirements at the Trust and are used with permission. Admissions did not contain any patient identifiable information, and contained date of admission, age at admission

(whole years), MSOA code, length of stay of the entire inpatient period and the admitting diagnosis as coded using the International Classification of Disease (ICD) 3-digit code. Distance of each MSOA to the hospital site in Wigan was calculated as straight line distance. Data for hospital admissions does not extend beyond March 2013.

All trends were analyzed using running 365 day or 12 month sums. This method is particularly suited to identifying the initiation point for a sudden step-like increase in activity which would arise from an infectious outbreak involving a persistent agent or from a step increase in admissions due to a reduction in admission threshold. The method is also particularly suited to the analysis of data which contains seasonal patterns since the running 12 month sum removes the underlying month-of-the-year patterns allowing comparison to be made between a time-series of 12 month totals. To determine the point of onset and value of any step-like change comparison is made between two successive 12 month periods, i.e. January to December 2012 versus January to December 2013. This process move forward one month at a time until the maximum percentage difference is reached and a visual check is performed that the end of a 12 month long ramp has been identified.

The potential contribution from Poisson variation to the value of any step-change was evaluated using Monte Carlo simulation for the ratio of two Poisson distributions, i.e. the likelihood of a change in a running 12 month total arising from chance. The 97.5% confidence Interval (CI) was calculated with 200,000 trials using Oracle Crystal Ball for an annual total (N) of between 100 and 700 in increments of 100. The resulting 7 values were plotted using Microsoft Excel and follow a power function where $97.5\% \text{ CI} = (1.965 \times N^{-0.0891}) - 1$. This equation was then used to calculate the 97.5% CI associated with the step-increase observed in the various locations. Given the fact that a Poisson distribution becomes less skewed at higher numbers, when $N > 1,000$ then the $97.5\% \text{ CI} = 2.7 \times n^{-0.5}$ [43].

3. RESULTS AND DISCUSSION

While deaths in the UK have been observed to peak in the 2003, 2008 and 2012 calendar years it is recognized that this is part of a far wider spatiotemporal spread in deaths which generally commences earlier in Scotland than England [1-6], although within England there are a range of initiation dates at LA level which overlap

with Scotland. For consistency these infectious-like events will be referred to by the calendar year in which deaths reach their peak across the whole of the UK. Up to the present international monitoring of increased death has largely focused on the winter months when seasonal influenza and other winter respiratory infections typically lead to spike increases in death and methods have been developed to detect such spike events [1]. However it has been consistently noted that these outbreaks lead to semi-permanent step-like increase in deaths and medical admissions [1-4,17-25] and a method suited to detecting step-like increases therefore needs to be employed. In a running 12 month sum, the point of initiation of a step-like increase is seen at the base of a 12 month long ramp. A running 12 month total trend for deaths (all ages) in Wigan is presented in Fig. 1 where the increase in deaths associated with the 2008 and 2012 events can be seen. The full extent of the increase is seen at the point 12 month after the start. If the step-like increase continues for more than 12 months then a plateau will follow as can be observed in Fig. 1. Hence at LA level the 2012 event appears to initiate for the *whole* of Wigan around February 2012 and endures for 15 months while the 2008 event initiates around January 2007 and endures for around 16 months. In Wigan the 2008 event therefore appears to initiate earlier than the UK average (more in line with Scotland), and appears to result in more deaths than the 2012 event (difference between peak and trough around April 2009).

The somewhat intermediate behavior in the running 12 month sum from March 2010 to November 2011 arises from the 2009 swine flu epidemic which concluded around August 2010 and from a bad winter period around December 2010 and January 2011. Such spike-like events create a plateau (rather than a ramp) in a running 12 month total. There are alternative methods which are more suited to analyzing such spike-like events/outbreaks [1-2]. However, note that there is no 12 month long ramp to indicate a step-like feature; that these intermediate effects have cleared away before the onset of the 2008 event, and that the 2009 influenza epidemic failed to increase deaths to the level seen in the 2008 and 2012 events, i.e. we are dealing with recurring events of high public health significance. Similar intermediate behavior is seen in some of the following figures, and Fig. 1 therefore provides a useful context. In this respect Fig. 2 shows the running 12 month trend in admissions and deaths experienced at the local hospital during this time.

Both admissions and in-hospital deaths commence the step-like increase around February 2012, although the shape of the running sum chart is different to that for all-cause mortality Fig. 1 since in-hospital deaths only account for roughly 50% of

all deaths in the UK and will tend to be associated with acute medical conditions/ diagnoses. The main point from Fig. 2 is that medical admissions rise almost in parallel to admissions leading to in-hospital death, i.e. the hospital standardized mortality rate is largely unaffected except perhaps very early in the outbreak (February to April 2012) and later (December 2012 to March 2013) when deaths rise faster than admissions. Reasons for this disparity will be discussed later but appear to be related to a time cascade in diagnosis/conditions emanating out of the outbreak.

Having established that the increase in deaths and medical admissions are linked, it is useful to study the trends in admissions in the 40 MSOA which comprise the Wigan LA area. In the past it has been assumed that these step increases are due to hospital-based reductions in the threshold to admission, a proposal which cannot explain the simultaneous increase in deaths, nor the apparent related cycle in the gender ratio at birth. However if this were the case, then admissions would simultaneously rise in all small areas surrounding the hospital. A preliminary comparison of admissions in 2012/13 versus 2011/12 indicated that there was no evidence for a simultaneous jump in admissions, nor any relationship between distance from the hospital, i.e. residents living close to the hospital using the ED as an alternative to primary care, and that there were no length of stay specific issues, i.e. the increase was not due to a change in the use of the assessment unit.

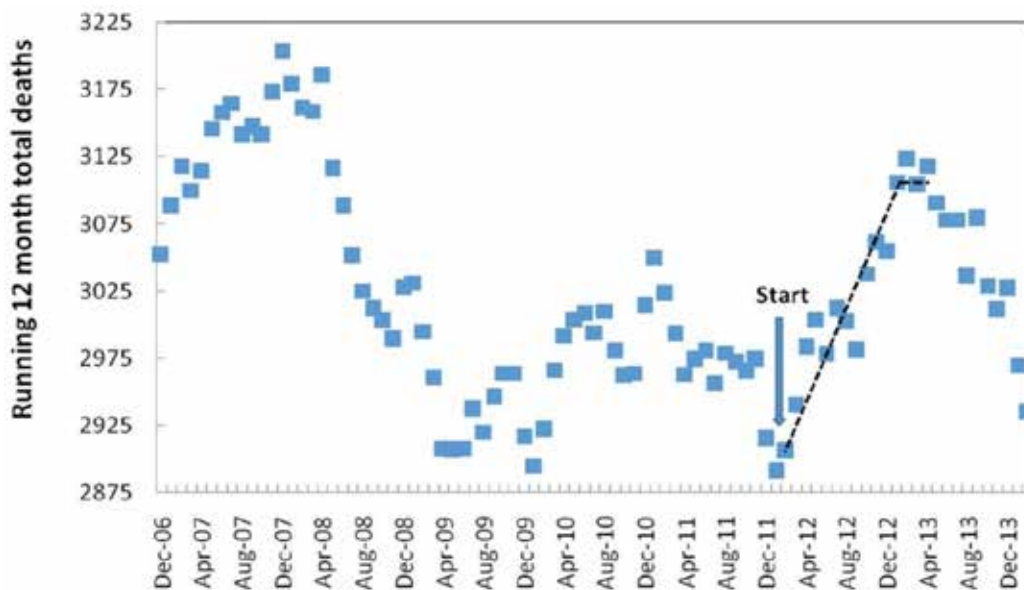


Fig. 1. Running 12 month sum of deaths (all-cause mortality) for residents of Wigan



Fig. 2. Trend in the running 365 day total of admissions by destination at discharge

Admissions are a running 365 day total and are relative to the minimum over the period. The difference to the minimum point has been calculated as standard deviation's equivalent assuming Poisson statistics where, by definition, one standard deviation equals the square root of the average. On this occasion the average is taken to be the running 365 day minimum number of admissions or deaths which occurs around January 2012

The change in admissions ranged from -14% for MSOA Wigan 016 (5.1 km from the hospital) through to +16% in Wigan 002 (3.4 km from the hospital). The trend in each MSOA was then evaluated to determine the onset of a step-like increase in admissions and the percentage increase in admissions. Due to the way in which the step-like increase is determined an initiation date of, say Jan-12, implies that the step increase occurs toward the end of the month or even very early in the next month. These results are presented in Table 2 where it can be seen that there are a range of initiation dates commencing in January 2011 through to June 2012. This wide range in initiation dates is highly reminiscent of an infectious spread and it would be very difficult to explain why there should be a series of step-like increases other than from an infectious event. The apparent initiation date around (late) January 2012 for the whole of Wigan is driven by the cluster of 10 MSOA initiating at that time and a balancing effect between other MSOA initiating before and after this pivot point. Indeed the very fact that the hospital and the LA experienced a sudden (and otherwise

unexplained) 14% increase in medical admissions is an unprecedented event, especially when this increase then persists for 15 to 18 months.

Poisson statistics describes the random variation around the average for whole number events such as deaths or admissions. The 97.5% confidence interval (CI) shown in Table 1 has been calculated assuming Poisson randomness, i.e. to what extent could a calculated percentage change be influenced by chance. The 97.5% CI has been used to give a slightly higher level of confidence over the usual 95% CI used in many studies. As is expected, those MSOA with higher number of admissions have a much tighter CI and chance can be excluded as a major contributing factor.

Fig. 3 presents running total trends for a sample of MSOA. Points to note are the variable trends downward from the previous winter which will presumably be due to a range of winter respiratory viruses and knock-on bacterial infections. All MSOA exhibit the highly granular effects that would be expected of any infectious event. The size of this previous winter event in each MSOA does not appear to be linked to the size of the 2008 event, i.e. these events are independent. However from a separate study of deaths in English LAs, there is some evidence to suggest that the size of the 2008 and 2012 events may be linked in that LAs experiencing a large increase during the 2008 event show a lesser increase for the 2012 event and vice versa [6]. This is suggestive of some form of linkage perhaps via the death of sensitive individuals.

Up to the present, demographic change (population ageing), has been assumed to be the main driver of hospital admissions. However based on a twenty year career in health care forecasting, the link with demography regarding the medical group of specialties is exceedingly tenuous and other factors appear to play a far greater role. As has been demonstrated the above patterns cannot be explained by hospital threshold to admission, since the behavior depends on location within the hospital catchment rather than the hospital *per se*. Weather and other environmental phenomena can likewise be discounted since all MSOA in Wigan will experience roughly the same weather. Likewise changes in the composition of the population simply do not happen in the sudden step-wise manner demonstrated in this study. The fact that the trend lines for patients discharged home or died in Fig. 2 are roughly parallel is another indicator that whatever is happening is not due to a change in the threshold to admission. If the threshold to admission had reduced then less acutely ill

patients would be admitted and the line for discharged home in Fig. 2 would rise more rapidly than that for deaths.

**Table 2. Initiation date and percent increase in admissions
(with confidence interval)
to a variety of MSOA**

Location	Initiation	Increase	97.5%	Admissions in 2012/13
Wigan 012	Jan-11	14%	11%	587
Wigan 004	Feb-11	17%	16%	355
St Helens	Feb-11	49%	19%	289
Wigan 028/029	Feb-11	16%	28%	120
Other nearby LA	May-11	23%	20%	244
Wigan 019	Jul-11	27%	15%	396
Wigan 026	Jul-11	41%	15%	398
Wigan 030	Jul-11	33%	18%	292
Wigan 023	Aug-11	27%	28%	119
Not Known	Sep-11	20%	9%	718
Wigan 024	Sep-11	30%	13%	502
Wigan 036	Sep-11	10%	13%	517
Wigan 021	Sep-11	17%	15%	424
Wigan 033	Oct-11	35%	12%	539
Wigan 032	Oct-11	24%	14%	471
Wigan 039	Oct-11	21%	17%	331
Wigan 007	Nov-11	60%	17%	351
Wigan 040	Nov-11	66%	16%	366
Wigan 003	Dec-11	42%	13%	485
Wigan 006	Dec-11	48%	13%	476
Wigan 011	Dec-11	37%	13%	486
Wigan 005	Dec-11	14%	14%	462
Wigan 020	Dec-11	20%	14%	434
Wigan 037	Dec-11	39%	18%	313
West Lancashire	Jan-12	32%	10%	698
All Locations	Jan-12	14%	1%	18,928
Wigan 015	Jan-12	11%	8%	811
Wigan 010	Jan-12	27%	9%	739
Wigan 009	Jan-12	19%	8%	795
Wigan 014	Jan-12	37%	11%	612
Wigan 031	Jan-12	57%	12%	577
Wigan 008	Jan-12	15%	14%	450
Wigan 002	Jan-12	40%	13%	482
Wigan 038	Jan-12	13%	14%	443
Wigan 001	Jan-12	39%	20%	260
Wigan 013	Feb-12	15%	12%	561
Wigan 027	Mar-12	21%	13%	481

Table 2 Continued....

Wigan 017	Apr-12	42%	26%	148
Other England	Jun-12	11%	25%	162
Wigan 034	No Increase	n/a	17%	341
Wigan 035	No increase	n/a	15%	425
Wigan 018	No increase	n/a	12%	552
Wigan 016	No Increase	n/a	13%	519

Admissions in 2012/13 are given as an indication of the relative size of each MSOA. Smaller MSOA

will have a larger confidence interval and vice versa. The confidence interval is calculated based on the number of admissions in the 12 months prior to the step-like change. The 'Other nearby LA group excludes St Helens. Wigan 028 and 029, which are adjacent, were aggregated due to small numbers of admissions. The four MSOA at the bottom of the table labelled no increase had not shown any apparent increase within the study period. Initiation at a later date is possible



Fig. 3. Running 365 day total trends for medical admissions from a variety of MSOA

Note that infectious events prior to this outbreak have ceased to affect the running 12 month total before the start of 2102, and on this occasion allows a clear view of the outbreak, the onset of which occurs at the foot of the ramp seen in each MSOA. The somewhat jagged nature of the trends is due in part of Poisson randomness and the presence or absence of other events influencing admissions.

However on this occasion the contribution from other events are of far less consequence than the particular outbreak of interest

While the apparent increase in deaths occurred around February 2012 in England and Wales, this is known to be part of a wider spread with the increase in deaths commencing first in Scotland as early as August 2011 in the Fife Area Health Board (a large geographic area) [5] and this appears to concur with the earliest onset in Wigan at around January/February 2011 in a minority of MSOA as shown in Table 2. The apparent increase for the whole hospital catchment area does not occur until January 2012, and a similar dispersion in timing will also be occurring in the larger Fife location in Scotland. Such spread is consistent with the transmission of epidemics via the movement of travelers (air, rail, motorway) followed by the movement of individuals within social networks at local small area level [44-45]. Note that emergency medical admissions (at least for some diagnoses) are a leading indicator of these outbreaks while deaths can lag up to a month behind [5]. Earliest introduction for Scotland and hence parts of the wider UK is probably somewhere around the start of 2011. Note also the generally later date for admissions from the rest of England, Other England in Table 2, who will be people on business, holidays or visiting family which are mainly from more southern locations and is indicative of a degree of north to south spread but with isolated pockets of earlier initiation [6].

It is the particular nature of the spatial spread of this infectious agent which gives a clue as to why it has remained undetected for so long. National trends in mortality are usually conducted at LA level for the simple reason that the number of deaths becomes too small for meaningful analysis at sub-LA geographies. A comparison of Fig. 1 (LA-level) and Table 2 and Fig. 3 (both at sub-LA level) reveals how the impact upon death is greatly under-estimated at LA-level. What is seen at LA-level is a composite picture of complex small area spread within each LA. Early initiation in a number of small areas, i.e. the MSOA in the top half of Table 2 pull the base line for the whole LA upward, and the running total for the LA only shows a 7.5% apparent increase in deaths which is far lower than the 8% to 66% (range) increase in admissions seen at MSOA level. Admittedly the link between increased deaths and medical admissions may not be a direct relationship, however the very high granularity at small area, both in terms of initiation date and percentage change, shows how the full extent of each outbreak has been concealed. The extent of concealment will be even greater when using data aggregated at national level [6].

Something similar to an influenza or SARS outbreak can be discounted, since such outbreaks usually last between 8 to 12 weeks and therefore in a running 12 month

total chart do not create the 12 month long ramp indicative of the semi-permanent step-increase as demonstrated in this study. The fact that the step-increase endures for 12 months or more is illustrated by the line for Wigan 003 in Fig. 3 where the increase is subsequently maintained from November 2012 through to March 2013, i.e. it has endured at least 17 months. This rise followed by an eventual decline with timing differences between local areas is, what is known in disease epidemic terms, as a travelling wave with spatial hierarchies [46-47].

Analysis of the change in admissions for patients with different length of stay in hospital is suggestive of different phases of an infectious outbreak. First to die are those who are already extremely frail, deteriorate rapidly and die within 24 hours of admission to hospital (data not shown). One month later deaths rise in those with 6-14 day stays and are probably frail but not excessively so, develop exacerbation of existing conditions and die after a moderate period of acute care. That deaths after a 2-5 day stay increase in December is probably a reflection of a subset of the population who experience weakening after 8 to 9 months of exposure and acute illness with death is then triggered by the following winter. This concept was incorporated into the modelling work of Dushoff [48] where the acquisition of the first infection leads to immune weakening with higher likelihood of acquiring a second opportunistic infection after a particular time lag. Whatever the explanation, we are not dealing with a phenomenon that can be explained in simplistic terms of admission thresholds.

A further key observation is the fact that emergency medical admissions are trending downward in the period prior to the proposed infectious outbreak which is contrary to the generally perceived role of the ageing population as the principle driver of ever increasing medical admissions. Such an upward and downward cycle has been demonstrated to be a part of these outbreaks, and indeed is a fundamental part of a cycle of surplus and deficit seen within the NHS in the UK and in the private health insurance industry in the USA over many years [26,31, see review 49].

Having established infectious-like spread at small area level within the larger LA, it is of interest to see if age and diagnosis play a role in these events. Analysis of deaths in England & Wales associated with the 2012 event, has already demonstrated single-year-of-age saw-tooth patterns reminiscent of what is called 'antigenic original sin, i.e. the consequences of the immune priming effects of repeat exposure to a series of different strains of the same agent [3]. In this respect Fig. 4 presents an

analysis of the effect of age upon the difference in admissions for twelve month periods before and after the event.

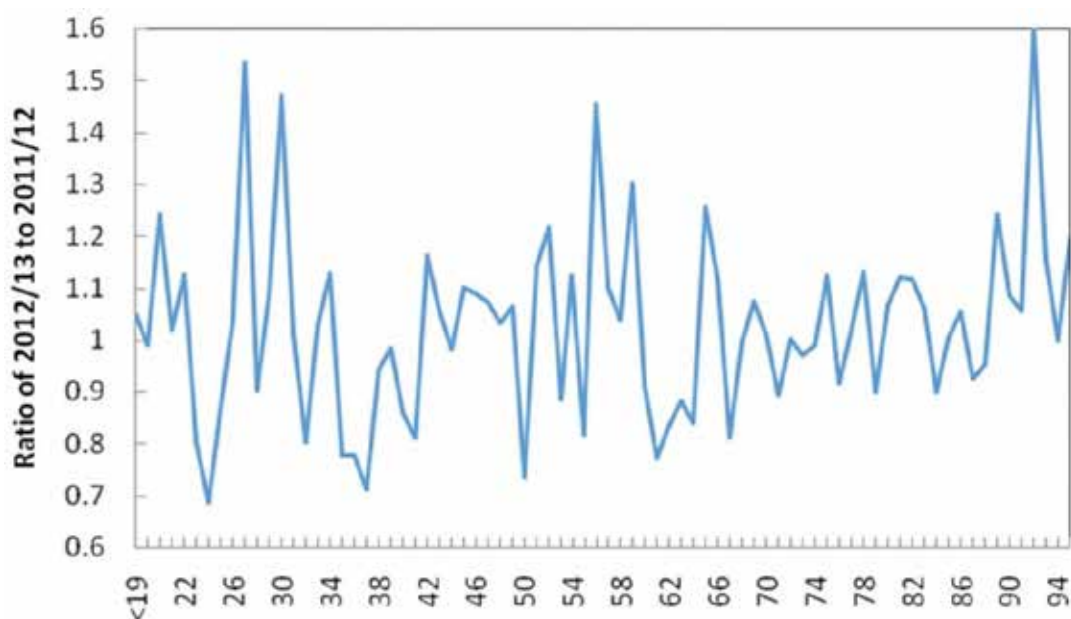


Fig. 4. Ratio of medical admissions in 2012/13 versus 2011/12 by single-year-of-age

Comparison of two twelve month periods is necessary to achieve statistically significant total admissions for each single year of age

As can be seen, the characteristic saw-tooth patterns are evident for medical admissions in Wigan as have been observed for deaths in England & Wales during the 2012 event [3] and for medical admissions in North East Essex during the 2008 event [43]. The implication is that the infectious events are due to different strains of the same agent, and that an immune response is involved. A further clue to immune involvement is given in Table 3 where a time cascade in diagnoses appears to be associated with the infectious-like event.

The possibility of a disease cascade following these outbreaks has already been suggested from a study of increased GP referrals associated with the 2008 outbreak and of outpatient attendance for specific dermatological conditions [32,34,36-37]. Another study also suggests that the 2012 event led to a shift in outpatient case-mix toward immune sensitive conditions [50] while admissions for the more aggressive forms of tuberculosis appear to lag some three years behind these outbreaks [51]. Based on a match with the diagnoses which increase during these outbreaks and are associated with increased death, the herpes virus cytomegalovirus (CMV) has been suggested as a possible causative agent [4,7-9,40-42]. This virus possesses a formidable array of immune evasive and modulating strategies which are implicated

in hospitalization and death [40-42,52-53]. In the USA a set of CMV-sensitive cancers appear to show a cycle of incidence induced by these outbreaks [54].

Table 3. Initiation date and percent increase in admissions for diagnoses associated with the infectious-like event

ICD	Description	Initiation	Increas
K92	Other diseases of digestive system	Jan-11	39%
834	Viral infection of unspecified site	Jan-11	115%
I21	Acute myocardial infarction	Jul-11	68%
K80	Cholelithiasis	Sep-11	22%
O23	Genitourinary infections in pregnancy	Sep-11	50%
K59	Other functional intestinal disorders	Nov-11	42%
T81	Complications of procedures NEC	Feb-12	24%
J18	Pneumonia organism unspecified	Mar-12	41%
L03	Cellulitis	Mar-12	23%
O26	Pregnancy related conditions	Apr-12	12%
J45	Asthma	Apr-12	14%
R06	Abnormalities of breathing	Apr-12	16%
S01	Open wound of head	Apr-12	14%
O68	Labor complicated by fetal stress	May-12	19%
R10	Abdominal and pelvic pain	Jun-12	30%

Analysis at the level of a single diagnosis is generally hampered by small numbers. Further studies on the possibility of disease cascades will need to cluster MSOA with the same initiation point to amplify the exact nature of the cascade

With respect to the issue of CMV, Table 3 is illuminating, since it encompasses a range of conditions known to be CMV sensitive [40-42,53]. The disease cascade is initiated with admissions for an unknown virus and/or non-specific gastrointestinal problems around January of 2011 and CMV-mediated vomiting, diarrhea, enteritis, colitis and inflammatory bowel disease is well recognized [53,55-57] as is the role of CMV in cardiovascular disease [58-59] and fatal myocarditis [60]. The cluster of respiratory conditions around March/April 2012 is also consistent with the lung as a major source of CMV infection [9,61] as is the role of CMV in allergic asthma [62]. The issues relating to pregnancy are likewise expected given a cycle in the gender ratio at birth which appears to accompany these outbreaks [39] and the well-recognized role of CMV in infection and complications during pregnancy [63-64]. The female genito-urinary tract is a well-known locus for CMV infection [64-65]. Such a progression of different diseases could be indicative of sites of direct infection and/or hastening of particular conditions via immune mediated effects against inflammation and auto-immunity [40-42]. An increase in admissions for 'open wound of head (ICD S01) is indicative of a by-stander condition. This diagnosis is part of a wider cluster of upper

torso injuries and fractures (unpublished), suggestive of increased falls among the elderly due either to the clumsiness associated with a generally higher level of illness during an infectious outbreak, or to giddiness which would link to the neurological aspects of CMV infection [8,40-42,53]. The apparent time cascade in conditions presented here is similar to those seen in North East Essex after the previous 2008 outbreak [43]. While the direct link with CMV awaits confirming studies, it would appear that a disease cascade could be a characteristic feature of these outbreaks.

More detailed analysis of cause of death has not been conducted in this study simply because the numbers are too small for statistically meaningful conclusions. However, several recent studies have been conducted on the increase in deaths during 2012 for the whole of England and Wales. Notable increases in death for those suffering from neurodegenerative diseases (mainly dementia, Alzheimer's and Parkinson's) and for respiratory conditions [8-9] have been characterized. A paper investigating increased digestive system deaths is currently in preparation. In all cases the conditions/diagnoses associated with increased death appear to be sensitive to CMV-mediated exacerbation.

This study raises important questions regarding the hidden assumptions behind age standardization of admission rates and hospital mortality rates. Almost all age standardization used in health care employs five year age bands, and it is assumed that there is no hidden spatiotemporal spread of an agent capable of influencing medical admissions and deaths to the extent demonstrated here. The author has noted that particular hospitals in England were temporarily flagged as showing high death rates for pneumonia during the 2012 event. It has been suggested that the unique spatiotemporal pattern of spread for this outbreak arises from some form of respiratory phase which enables the very rapid local spread seen in the step-like increases [9,43]. Since pneumonia is one of the most common causes of in-hospital death, the highly granular nature of the spread across the UK combined with the single-year-of-age saw-tooth nature of the increase will invalidate the assumptions lying behind age standardization of hospital mortality and the seemingly sporadic flagging of hospitals will result, especially for pneumonia. Indeed it was such sporadic flagging of apparent excess mortality at this hospital, which has an otherwise exemplary record, along with the accompanying increase in medical bed occupancy which gave the impetus for this study. Given the link between marginal changes in death and medical admissions seen in Fig. 2 and demonstrated elsewhere [33,66],

this work also raises questions regarding the hidden assumptions contained in the NHS (England) funding formula [67].

As with any study there are several limitations worthy of comment. The use of a running 12 month sum is adequate for the detection of a step-like change in admissions and deaths, however, future studies will need to employ a range of alternative methods to further characterize the spread of this agent and strip out any simultaneous contribution from temperature changes and/or other infectious outbreaks which may overlap with the 12 to 18 month period in which admissions and deaths remain high. At the present CMV is not a notifiable infection and detailed studies will be required to determine, if and how, this agent is involved. If a new strain is implicated then both genetic and viral surface glycoprotein changes could be implicated, and this will necessitate appropriate methods over and above the usual measurement of anti-CMV IgG and IgM levels in blood.

It is probably apposite to ask why it has taken so long to recognize the existence of these infectious-like outbreaks. Unusual events such as these are not new. In 1969 the Western Infirmary in Glasgow reported a 27% increase in medical admissions in the six months August 1969 to January 1970 compared to the same period a year earlier [68]. A similar large increase also seems to have occurred in Scotland in late 1984 or early 1985 [69]. In the financial year 1993/94 emergency admissions across England had increased by 7 to 13% compared to 1992/93 [70-71]. At the Aintree hospital in Liverpool there was a 37% increase in medical admissions with an unexpected large increase in the 15 to 44 age group, while in nearby Manchester admissions to one mental health hospital increased by >30% [70]. Parallel increases in medical and mental health admissions were replicated across the whole of England, and medical admissions at the Royal Berkshire Hospital increased unexpectedly by 13% commencing in the middle of March 1993 [72] as did the number of occupied medical beds [73]. Events such as these are usually dismissed as having little relevance to present day changes and pressures in the NHS. Unfortunately in the absence of the knowledge of infectious-like spread, a host of studies into these events assumed that the 'problem was due to a mix of social change and the inability of health service organizations to manage demand [74-77]. While such factors are important in the correct context, they do not lead to large step-like increases in emergency admission, however, such thinking had become so entrenched, that all rises in emergency admission are interpreted from that framework.

Hence the report by the Nuffield Trust suggested that increases in emergency admissions between 2004/05 and 2008/09 were largely due to a reduction in admission thresholds [10]. However, this (unproved) assumption contradicted the conclusions from two earlier studies. In the first, research in the USA had demonstrated that acute admission thresholds are maintained despite considerable fluctuation in demand [78], while in the second it was suggested that emergency medical admissions only ever rose in sudden spurts [19-20], as per the reports cited above [68-71]. Indeed the data presented in the Nuffield Trust report shows evidence for one such spurt of growth at the end of the study period although the significance of this seemed to have been overlooked, but was noted by others [79]. Given the evidence presented in this study, it would seem that preconceived notions may need to be re-evaluated.

These are initial studies conducted in an attempt to explain an otherwise poorly understood phenomena. The results need to be confirmed over wider geographies, and a continuous study over the period 2000 to present would be useful to identify both the 2003, 2008 and 2012 events. Given that it is far easier to demonstrate statistical significance in MSA with >300 admissions per annum, the aggregation of MSA with a common initiation date will assist in such studies although this criteria is more readily met in more densely populated urban areas. Such aggregation will further facilitate analysis of cause of death and possible time cascades in both admission and death. It has also been suggested that an outbreak of this agent earlier in the year acts to potentiate the effect of seasonal influenza during the following winter [17-18,43]. This preliminary study will hopefully stimulate further research.

4. CONCLUSION

Evidence has been presented to show unique spatial behavior within Wigan leading to increased emergency admissions at the time that deaths were observed to increase at a local and national level. Acute admission threshold changes can be categorically ruled out as the cause. The cause of the increase shows small area spread, and the characteristic saw-tooth pattern of change in admissions with age is suggestive of antigenic original sin. At the very least, emergency admissions are defying all known models relating to supposed demographic change. The unusual trends seen at larger geographies such as primary care organizations, acute hospitals, regions, state and whole country, are the composite of the small area spatiotemporal trends. Infectious spread of an unrecognized agent is a likely cause and requires

further urgent investigation. The ubiquitous herpes virus, cytomegalovirus, could be involved but this requires further study.

CONSENT AND ETHICAL APPROVAL

Patient consent was not required. Ethical approval was not required. No patient identifiable data was used in this study.

ACKNOWLEDGEMENT

The contribution of the BJMMR reviewers is acknowledged with gratitude. Permission to use the data by the Wrightington, Wigan & Leigh NHS Foundation Trust is gratefully acknowledged. The opinions expressed in this paper are exclusively those of the author and may not reflect those of the Wrightington, Wigan & Leigh NHS Foundation Trust.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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Public Health Informatics: a Brief Review of the Field

ABSTRACT

In the global community of today, the importance of accessing timely and relevant information has increased in value. However, with the exponential increase in data and data sources, innovations to monitor, control, and effectively manipulate data are required, especially to resolve current mysteries. In addition, with the sophistication of informatics systems, consumers are becoming curious to learn about the technology for their own benefit. In learning information technology, tools become available that gives the consumers ideas and knowledge in conducting research about their health and other health information data. For clinicians it is highly useful to become knowledgeable about health information system as well as larger public health issues. PHI is highly utilized in many global health organizations, government agencies, and medical organizations across the United States as well as in the world.

Keywords: public health; informatics; computer assisted decision making; surveillance; literature review.

1. INTRODUCTION

Approximately two decades ago, public health informatics (PHI) was formally recognized as an applied scientific discipline formed to further improvements in public health monitoring and assessment as well as healthcare service delivery and performance. The whole collection of the technical information has been subdivided into various healthcare practices and associated disciplines [1]. Leveraging information technology, PHI provides an array of substantive capabilities to conduct research and implement the outcomes associated with a particular study to any of a number of field professions. On a technical level, PHI integrates different levels of research and implementation through human-computer interaction. As such, "The public health focuses on population and society's role in monitoring and achieving good health and quality of life" [2, p. 25].

In order to effectively manage public health practice and enhance the well-being of society, multiple resources that provide accurate, high-quality and timely information are required [3]. Public health professionals have stood as pioneers in the development and adoption of computerized information systems and surveillance programs [4] with the explicit goal of enhancing the quality of life and facilitating strategies that protect public health. The purpose of the present paper was to briefly examine how research activities and outcomes conducted through public health informatics (PHI) provide improvements in the maintenance and delivery of the health care system, including enhancement of the detection of emerging threats to public health. With advance information technology system, the PHI has been considerably utilized by organizations charged with monitoring public health, healthcare organizations, and even primary care practitioners. The competences cogently communicated and well-designed public health informatics system are applied and delivered by skillful and knowledgeable practitioners. PHI serves to inform public health via the field's ability to investigate and design data based on large-scale population metrics and to match or compare the results with other data solutions [5]. Although most organizations and employers utilize computer information system, as a discipline PHI possesses multiple capabilities of structures and content of data sources commonly available to public health practitioners. Indeed, information sharing offers an array of benefits that can impact quality improvement activities and, more important enhance engagement among critical health constituencies including clinicians in the effective and timely use of information [6].

2. BACKGROUND

The United States is known for burgeoning health care expenditures and in fact is among the fastest growth rates in health spending of all developed countries [7]. Among Americans, there is considerable variation in attitudes about the use of health care technology. Unfortunately, differences in technological affinity as well as perceptions that vary along demographic dimensions remain an issue [7]. The capabilities of the information technology are phenomenal. Nonetheless, across the world information technology system is utilized to retrieve an individual's information, to monitoring emerging patterns of illness, and to detect emerging or imminent threats to public health. Biomed Central defined public health informatics as the, "systematic

application of information and computer science and technology to public health practice, research, and learning that integrates public health and information technology" [1, p. 1]. In addition, within the healthcare industry, it is a highly important infrastructure necessary to provide quality service delivery and performance. As the technological information systems continuously are used to guide further research for advance program design, PHI provides a variety of resources to assist people in furthering their ends [2]. Because medical practitioners are dedicated of providing care to patients, PHI is also available to provide helpful tools to use to retrieve information.

3. THE OBJECTIVES OF PUBLIC HEALTH INFORMATICS

One of the objectives specified in a recent article in Health Informatics Journal is a need to determine if PHI is sufficiently addressed as a core competencies among those trained in public health [8]. The public health informatics system provides various services for multiple stakeholders, from patients to public health administrators. As with the implementation of any new methodology and/or technology, a variety of ethical issues must be considered. These have been discussed in varying detail elsewhere [3,5,8,9]. At any rate, with PHI consumers have the opportunity to expand their technical knowledge and develop ideas for excellent service and performance. PHI demonstrates its capabilities for medical records become paperless. It produces several benefits such as encouraging the administration to provide additional training for professionals to incorporate with business as well as partner with clinicians for excellent patient care service delivery.

4. REVIEW OF THE LITERATURE, INTEGRATION WITH OTHER FIELDS AND RELEVANT EXAMPLES

Beginning in 1995 [9], PHI has been defined as a specific albeit interdisciplinary field where the advances in computer technology were seen as highly adaptable to advance health care [10]. Although a number of definitions have been introduced into the literature [3,11], all carry the common theme that PHI as the name implies, is a marriage of medicine (public health), computer science, and information processing (informatics) [12]. Nonetheless, although medical in nature, the field is distinguishable from other areas of informatics such as those consumer-based, biomedical, and medical in nature. As such, PHI is focused on population-level information designed

at amelioration and prevention at each node within a causative chain, and serves as applied science within relevant government settings where public health is a core goal [3].

As new trends in monitoring, intervention, and aggregation of data emerged and accelerated during a concurrent explosion in hardware and software advances in the computing sciences, PHI coalesced within public health as a natural outcome of the Zeitgeist of the times [3,11-15]. As a result, a myriad of goals developed including the promotion of public and consumer health, knowledge management, information assurance practices [10] as well as the development of public health information sources and supporting infrastructure [16].

By the very nature of their responsibilities, individuals and organizations involved in public health in an official capacity are responsible for detection and monitoring of risks, both environmental and biological in nature. Such responsibilities are distinct from those of involved in primary medical care who are charged with frontline diagnosis and treatment. With the emergence of PHI as a field, population level surveillance has moved beyond detection of trends in population health to the inclusion of emerging and often novel threats associated with syndromic surveillance [17]. Briefly, Syndromic surveillance has been used for early detection of outbreaks, to follow the size, spread, and tempo of outbreaks, to monitor disease trends, and to provide reassurance that an outbreak has not occurred. Syndromic surveillance systems seek to use existing health data in real time to provide immediate analysis and feedback to those charged with investigation and follow-up of potential outbreaks [18, p. 5].

Such informatics strategies are useful as ways of getting out in front of virulent forms of infectious diseases in a globally linked world as well as biological agents used as tools of terrorism [19,20]. Concomitant with this type of monitoring, is the use of geographic information systems (GIS)-based images for mapping out distribution patterns to assess emerging patterns of distribution of threats to public health, whether the threat is environmental or biological [17]. As an analytic strategy, this differs from the more traditional use of public (or restricted) digital health records used for diagnosis and treatment. Thus, the use of the tools in PHI brings to bear novel strategies and resources for the timely detection and management of disease clusters, ecological analyses, and vectors of exposure [17].

During the economic crisis of the past decade, the American Recovery and Reinvestment Act was passed. Among other things, the act brought considerable economic stimulus monies to fund the continued implementation of electronic health records and health information exchanges with the goal of having a fully modernized system in place by 2014 [21]. In addition to the informatics developments described earlier, elements of the system was seen as a means to provide information about geographic areas that have concentrations of unfavorable health indicators or were comprised of populations of underserved groups [22]. Through the development of such information gathering and repository strategies, accurate information about an entire population groups could be determined, rather than from only those who sought services in the past. Thus, these systems permit assessment of disparities of health status among different population subgroups along a number of dimensions including sex, race, and age [22].

Nonetheless, there are unanticipated roadblocks and challenges that can undermine the best of intentions. In a nutshell, all programs entail risk but unforeseen roadblocks can nonetheless present an opportunity to improve upon existing strategies. While the utilization of PHI to inform and enhance local, state, and national health is a laudable goal, lack of proper consideration of contextual elements of the program during implementation can lead to failure [23]. Here, a government program designed to create a monitoring framework utilizing a primary care based framework to detect and track hepatitis B is instructive. Multiple breakdowns in program effectiveness occurred as a result of erroneous assumptions about a number of factors including the IT and software milieu, participants, and available infrastructure. Analysis of program failures revealed that inadequate attention to the key technological and health care as well as a variety of social and political factors undermined success [23].

Conversely, other programs in PHI have produced more direct positive effects. Salient examples can be found in among public health strategies that deal with common viral diseases such as Lyme disease in the United States and, more globally, Malaria. The most common vector borne disease in the United States [24,25], Lyme disease is caused by a tick-borne spirochete (*Borrelia burgdorferi*). First, widely reported in the 1980s, it is now tracked at the national level. Although a concern in

the United States, malaria is a severe problem especially in Africa [26]. Globally, the disease kills between one and a half to two and a half million people a year [27].

Using the tools of PHI, models of Malaria outbreaks and vector habits have been developed [28,29]. In the United States, the use of GIS analysis has proven quite effective in identifying climate and habitat considerations conducive for the spread of the disease via deer ticks [24,25,30]. On the basis of such data, environmental interventions to inhibit the establishment of Lyme disease causing virus have led to reductions in risk to human populations [31].

Similarly, through modification of an existing source of health records, new avenues to assistance with public health surveillance are available and these strategies are consistent with PHI. For example, death records often contain information that when properly used and mined for information, can assist with detection and patterns of influenza as well as viral and bacterial pneumonia [32]. In addition, utilizing a Death certificates pipeline and Meta Map software [33], can inform public health professionals with systematically assessing the impact of extreme environmental conditions such as severe winter conditions or prolonged heat waves on a vulnerable populations or relevant public health threats such as severe acute respiratory syndrome [34-36].

While concerns remain about data security and privacy, electronic health records [37,38] can act as a mechanism of change to enhance stability population level health as well as enhance the overall level of health within a given population [39]. Further, electronic health records are a valuable mechanism for providing timely data for population and disease registries, such as registries of designer drugs of abuse or newly diagnosed cancers [c.f.,40]. Digitizing health records along with central protected government access can enhance government estimates of health and disease burdens [41]. Further, critical population subgroups can be quickly identified, reducing costs, while facilitating program planning, implementation, review, and refinement [42]. However, for population health data to remain both accessible and protected, adherence to rigors standards is required [41]. Fully embracing specific standard such as the Public Health Reporting Initiative within the Standards and Interoperability Framework [43] and the International Classification of Functioning, Disability and Health [44] are important steps. Certainly these are critical to fully and effectively utilises the rich data of use to public health professionals.

In addition to syndromic surveillance strategies, adaptive cooperative organizational systems can monitor control measures in a manner far superior to that when monitoring is limited to the local organizational level. For example, using a computer simulation to model organizational behavior in Orange County California hospitals, Lee and colleagues [45] convincingly demonstrated that inter-hospital cooperation and data sharing facilitate so-called contact isolation. Lee and colleagues research examined active control and data sharing mechanisms when dealing with a pressing issue of systemic infection-methicillin-resistant *Staphylococcus aureus*, or MRSA [46]. Thus, cooperative efforts across hospitals can enhance effective infection control, especially when infections have potentially costly and deadly consequences. While the research of Lee and colleagues involved the facilitation of data sharing, it is not hard to conceive of extended such strategies extended to national monitoring for changes in such opportune infections as MRSA or resistance to existing antiviral treatments [47].

In closing, knowingly society has been adapting to the use of information technology usage in home, office, and public access areas. The strategic plans in enhancing patient care delivery and delivery performance ultimately affect all areas of society. In addition, this topic is relevant when identifying barriers and in order to emphasize essential issues that must be addressed in order to embrace that intellectual use of data information recommendation [6]. Given this, it is not surprising that multiple centers of PHI exist at both federal and local levels. These include supportive organizations such as the CDC's Public Health Information Network PHIN, the National Center for Public Health Informatics, and the PHI Connect Center for Public Health Informatics [8].

5. CONCLUSION/RECOMMENDATIONS

The impact of PHI systems in the health care industry reduces the risk of medical errors and helps consumers to prevent risk of fatal diseases. With PHI, there are many aspects that relevant to patients' services. PHI systems involve the creation, storage, research, and contributions that facilitate clinical and public health decision-making. Medical practitioners utilize PHI to help improve their competency and service delivery. According to Collie and colleagues, "while coding is an important aspect of our professional knowledgebase, our most strategic contribution to the health reform

agenda will be in assisting health services to leverage data and information for decision making and self-improvement" [6, p. 29]. Among the relevant solutions to these issues, company administration is mandated in offering computer training and its application to clinicians. The advantages associated with such solutions are seen in a marked increase in the ability to provide the proper care and quality of care to patients in all areas of public health and medicine.

The progression of advanced technology continues at a rapid pace. As a consequence, relevant constituencies struggle to incorporate new information without delaying new programs or systems. Further, information sharing at a comprehensive level will facilitate understand at both the individual patient and population levels [48].

As this brief review suggests, more needs to be done. Indeed, PHI is insufficient to resolve all of the challenges associated with modern public health in a global world. Nonetheless, it is clear that all areas of public health practice benefit from the continued development of informatics frameworks and technologies [14]. As a field, PHI lends itself not only to public health practices, but also to research, strategic outcomes, and learning [49]. Today, there is a recognition that the traditional high versus low risk dichotomy is no longer sufficient to drive positive changes in public health, once it is considered alongside of the myriad of indefinable lifestyle, economic, genetic, and environmental factors present [50]. PHI, with its interdisciplinary origins firmly based in public health, data analysis, and computer science, can contribute much to bettering the human condition.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Study of the Hormones Controlling Food Intake (Leptin and Agouti Related Protein “AgRP”) in Cannabis Smokers

ABSTRACT

Background: Leptin is an adipocyte derived hormone which is thought to be a key regulator of food intake and body weight. Agouti-related protein also called Agouti-related peptide (AgRP) is a neuropeptide produced in the brain by the AgRP/NPY neuron. It is one of the most potent and long-lasting of appetite stimulators. The appetite stimulating effects of AgRP are inhibited by the hormone leptin. There is a public perception that exposure to cannabis produces an increase of appetite (a phenomenon referred to as the 'munchies'). This phenomenon needs an exploration of the role of the endocannabinoid system in the regulation of obesity and associated metabolic syndrome.

Aim: This study aimed to find out the food intake style, of subjects smoking cannabis by studying the relationship between the most two popular hormones controlling food intake (leptin hormone, and agouti related protein hormone) compared with healthy subjects.

Methods: The study compared two groups of personells; the test group (Group II) included ten males aged 37.40 ± 2.67 years (mean age \pm SD) with positive 9-carboxy-Tetrahydrocannabinol (THC) detected in their urine by qualitative analysis using Gas Chromatography-Mass spectrometry. And control group (Group I) included ten healthy males aged 38.67 ± 2.35 years (mean age \pm SD) as volunteers with negative 9-carboxy-Tetrahydrocannabinol (THC). In both groups, age and body mass index (BMI) were matched, diabetic subjects were excluded. Plasma leptin concentration was measured by quantitative radio immunoassay (RIA). Human plasma AgRP hormone was quantitatively measured by using a kit supplied from Quantikine R&D systems INC.

Results: In group I (GI), there was an increase in mean plasma leptin concentrations \pm SD (6.39 ± 1.93) ng/ml, than that found, in group II (GII) (4.49 ± 1.40)

ng/ml, but it's statistically insignificant ($P>0.05$). There was an elevation, in mean plasma AgRP concentrations (27.77 ± 2.17) pg/ml in GII, comparing with mean plasma AgRP concentrations (25.84 ± 1.93) pg/ml, in GI but it's statistically insignificant ($P>0.05$). There was a statistically significant inversely correlation between plasma leptin concentrations and plasma AgRP concentrations in GI ($P<0.05$). There was a proportionally correlation found between plasma leptin concentrations and plasma AgRP concentrations in (GII), but it's statistically insignificant ($P>0.05$).

Conclusion: The relationship between plasma leptin concentrations and plasma AgRP concentrations affected by smoking cannabis, and that may change the mechanism of food intake in cannabis smokers.

Keywords: Leptin; Agouti Related Protein (AgRP); 9-carboxy-Tetrahydrocannabinol (THC); cannabis; RIA; Immunoassay.

1. INTRODUCTION

Appetite is regulated by a number of hypothalamic neuropeptides including neuropeptide Y (NPY), a powerful feeding stimulator that responds to feeding status, and drugs such as nicotine and cannabis [1].

Leptin is an adipocyte derived hormone which is thought to be a key regulator of food intake and body weight [2]. During times when leptin stores in adipocytes are decreasing (e.g., with fasting induced lipolysis), plasma leptin levels would be expected to be suppressed, stimulating food intake [3]. Conversely, during times when lipid levels in adipocytes are increasing (following over nutrition), plasma leptin levels would be expected to rise, curbing additional food intake [4].

Agouti-related protein also called Agouti-related peptide (AgRP) is a neuropeptide produced in the brain by the AgRP/NPY neuron. It is only synthesised in NPY containing cell bodies located in the ventromedial part of the arcuate nucleus in the hypothalamus [5]. AgRP is primarily expressed in the adrenal gland, subthalamic nucleus and hypothalamus; with lower levels of expression in the testis, kidneys and lungs. The appetite stimulating effects of AgRP are inhibited by the hormone leptin and activated by the hormone ghrelin. Adipocytes secrete leptin in response to food intake. This hormone acts in the arcuate nucleus and inhibits the AgRP/NPY neuron from releasing orexigenic peptides [6]. It is one of the most potent and long-lasting of appetite stimulators [7]. Levels of AgRP are increased during periods of fasting. It has been shown that polymorphisms in the AgRP gene have been linked with anorexia nervosa [8]. AgRP induces obesity by chronic antagonism of the MC4-R [9]. Overexpression of AgRP causes hyperphagia and obesity [10], whilst AgRP plasma

levels have been found to be elevated in obese human males [11]. Recent studies have shown that autophagy plays a key role in regulation of food intake and energy balance in maintaining neuronal AgRP levels [12].

Chronic consumption of low-fat diet leads to increased hypothalamic AgRP and reduced leptin [13].

Cannabinoids, the biologically active constituents of marijuana, have been used for millennia for their psychoactive properties. The marijuana plant contains more than 60 distinct chemical substances, of which Δ^9 -tetrahydrocannabinol (THC) is the main psychoactive ingredient [14] subsequently led to the discovery and cloning of 2 specific cannabinoid receptors, CB1 and CB2 [15]. Both receptors are expressed in the CNS, as well as in the peripheral tissues. CB1 was found to be one of the most prevalent G-protein coupled receptors in the mammalian brain, while CB2 was shown to have prominent roles in immune and haematopoietic cells, as well as osteoblasts and osteoclasts [16]. The most widespread abuse of cannabis is by smoking. It may occasionally be abused orally. Over 80% of the excreted cannabinoid metabolite, 9-carboxy-THC is present in the urine in the form of glucuronid conjugated [17].

Obesity is one of the highest preventable causes of morbidity and mortality in the developed world. It has been well known for a long time that exposure to cannabis produces an increase of appetite (a phenomenon referred to as the 'munchies'). This phenomenon led to an exploration of the role of the endocannabinoid system in the regulation of obesity and associated metabolic syndrome [18].

2. AIM

This study aimed to find out the feeding patterns, of subjects smoking cannabis by studying the relationship between the most two popular hormones controlling appetite and food intake patterns (leptin hormone, and agouti related protein hormone) compared with healthy subjects.

3. METHODS

The study compared two groups; the test group (Group II) included ten males aged 37.40 ± 2.67 years (mean age \pm SD) with positive 9-carboxy-Tetrahydrocannabinol (THC) detected in their urine by qualitative analysis using Gas Chromatography-Mass spectrometry (Agilent 6080N - capillary column 30m - 1μ diameter) collected from forensic medicine institute chemistry lab. Cairo, Egypt. And control group (Group I) included ten healthy males aged 38.67 ± 2.35 years (mean age \pm SD) as volunteers

with negative 9-carboxy-Tetrahydrocannabinol (THC). In both groups, age and body mass index (BMI) were matched, diabetic subjects were excluded. Plasma leptin concentration was measured by quantitative radio immunoassay (RIA) using a kit supplied from diagnostic systems Laboratories (DSL) Inc. (445 medical center BLVB. WEBSTEER TX 77598 USA, the method depend on a non-competitive assay in which the analyte to be measured is "sandwiched between two antibodies. Human plasma AgRP hormone was quantitatively measured by using a kit supplied from Quantikine R&D systems INC. (614 McKinley Palace Minneapolis, MN 55413, USA.), this assay employs the quantitative sandwich enzyme immunoassay technique.

SPSS® ver 10 for Windows® (SPSS, Inc., Chicago, IL, USA) was used for data analysis. Qualitative data were presented as number and percentage; quantitative data were presented as mean±SD. The D2 test was used to test the association between two categorical variables. Correlation between BLL and manifestations of pre-eclampsia was measured by Pearson correlation coefficient. A p value <0.05 was considered statistically significant.

4. RESULTS

Table (1) shows the plasma leptin and AgRP concentrations in GI and GII. Plasma leptin concentrations were lesser in GII (4.49 ± 1.40 ng/ml) than in GI (6.39 ± 1.9 ng/ml), while plasma AgRP concentrations were greater in GII (27.77 ± 2.17 pg/ml) than in GI ($21.5-27.6$ pg/ml). There was a statistically significant inversely correlation between plasma leptin concentrations and plasma AgRP concentrations in GI, with P value ($P < 0.05$) (Fig. 1). There was a positive correlation found between plasma leptin concentrations and plasma AgRP concentrations in GII, but it's statistically insignificant with P value ($P > 0.05$) (Fig. 2). In GI, there was a statistically significant positive correlation between plasma leptin concentrations and BMI ($P < 0.05$) (Fig. 3) and statistically significant inverse correlation between plasma AgRP concentrations and BMI ($P < 0.05$) (Fig. 4). In GII, there was no correlation between plasma leptin concentrations and BMI (Fig. 5) but statistically insignificant inversely correlation between plasma AgRP concentrations and BMI ($P > 0.05$) (Fig. 6).

Table 1. Comparison between cannabis smokers (GII) and the control group (GI)

Hormone level	Control group (Gi) n=10	Test group (Gii) n=20	T test	p
	Mean ± SD	Mean± SD		
Plasma leptin concentrations (ng/ml)	6.39±1.9	4.49±1.40	1.90	0.094
Plasma AgRP concentrations (pg/ml)	25.84±1.93	27.77±2.17	4.20	0.003
Body mass index (BMI) kg/m ²	22.78± 1.38	23.41±1.29	1.52	0.166
Serum creatinine (mg/dl)	0.72±0.27	0.87±0.27	4.21	0.003
Serum ALT (U/L)	19.6±7.7	20.2±7.78	2.26	0.054
Serum AST (U/L)	16.6±7	20.5±5.4	1.37	0.20

5. DISCUSSION

This study demonstrates that cannabis smokers have a lower plasma leptin and a higher AgRP concentrations than comparable individuals not smoking cannabis, that is associated with increased BMI in cannabis smokers. This denote that cannabis smoking can modulate the body weight through affection of appetite and feeding pattern by changing leptin and AgRP concentrations. This finding is consistent with [19] that suggest that AgRP, an endogenous negative regulator of the hypothalamic melanocortin system, constitutes a novel regulatory mechanism of leptin action within the hypothalamus. Antagonism of leptin action by AgRP should be attributable mostly to its ability to block the hypothalamic α -MSH/MC4-R signaling activated by leptin. The discussion above also supports the notion that the hypothalamic melanocortin system plays a pivotal role in leptin action.

Our results are in concordance with that of [20] who suggested that leptin's inhibition of food intake is in part mediated by downregulation of CB1R and that of leptin-deprivation conditions. These results are consistent with other findings showing increased levels of endocannabinoids of the ob rats corroborating the regulation of cannabinoid signaling by leptin.

It has been well known for a long time that exposure to cannabis produces an increase of appetite (a phenomenon referred to as the 'munchies'). This phenomenon led to an exploration of the role of the endocannabinoid system in the regulation of obesity and associated metabolic syndrome [18].

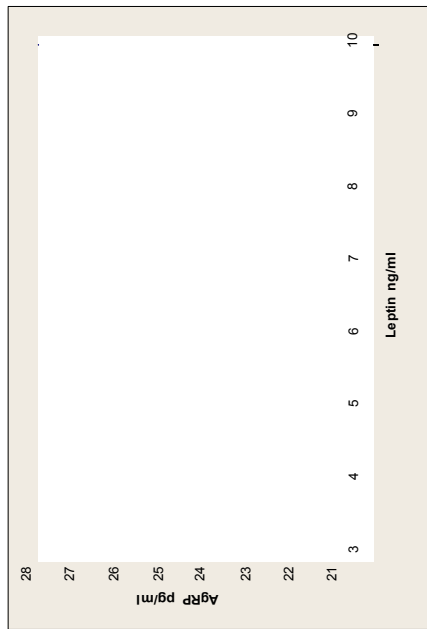


Fig. 1. Correlation between plasma leptin concentrations and AgRP in GI

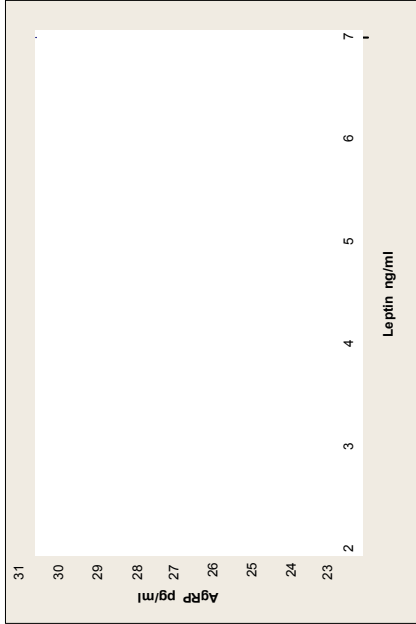


Fig. 2. Correlation between plasma leptin concentrations and AgRP in GII

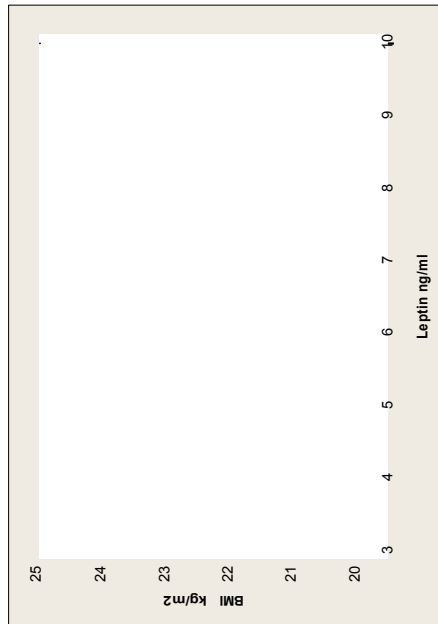


Fig. 3. Correlation between plasma leptin concentrations and BMI in GI

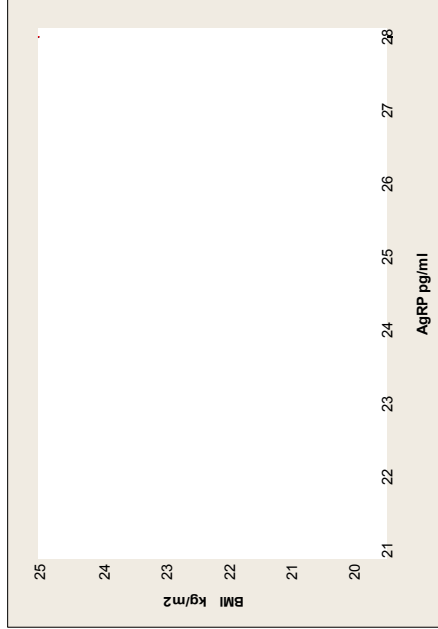


Fig. 4. Correlation between plasma AgRP concentrations and BMI in GI

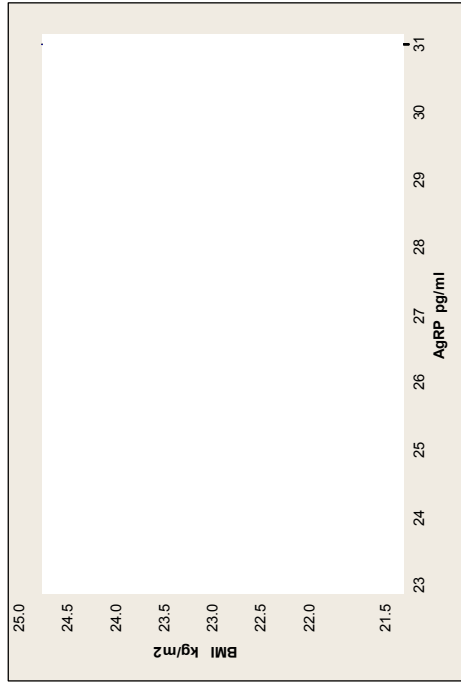


Fig. 6. Correlation between plasma AgRP concentrations and BMI in GII

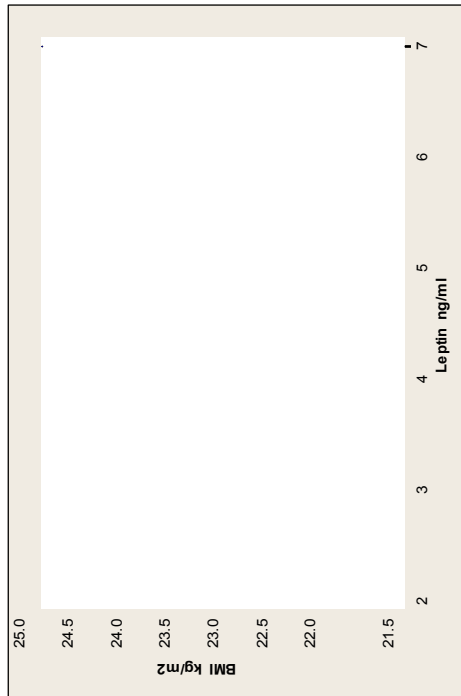


Fig. 5. Correlation between plasma leptin concentrations and BMI in GII

Leptin regulates hypothalamic signaling that underlies the motivation to hyperphagia but the interaction between leptin and Cannabinoid signaling is poorly understood [20].

Results of the present study showed that cannabis smoking modulate the relation between leptin and AgRP that was associated with increased BMI. There was statistically insignificant positive correlation between plasma leptin and plasma AgRP concentrations in cannabis smokers compared to statistically significant inverse correlation between them in non smokers. Both animal and human data show that the endocannabinoid system is up-regulated in obesity [21]. The plant *Cannabis Sativa* has been used to promote caloric intake by enhancing appetite for many years ago [22]. It seems that Cannabinoids interact with a number of hormonal systems and possibly mediate their effects as leptin, Ghrelin adiponectin and Neuropeptide Y (NPY) and others [21].

It appears likely that some of the obesity-producing effects of AgRP expression in the brain may be due to its interference with signal generation by MSH at MC4-R, a signal which normally acts to suppress food intake and we support this explanation which agreed with [23,24,25] who showed that melanocortineric neurons inhibit feeding behavior. Chronic disruption of this inhibitory signal causes the agouti obesity syndrome, and [26] who reported that agouti signal protein gene expression is negatively associated with the degree of obesity in men whereas an opposite relationship was observed in women.

Another explanation [25] reported that recombinant agouti protein directly increased $[Ca^{2+}]$ in a variety of cells and stimulated both the expression and activity of adipocyte fatty acid synthase and increased triglyceride accumulation in a Ca^{2+} dependent manner. These effects can be mimicked by stimulation of Ca^{2+} influx and blocked by Ca^{2+} channel inhibition, while treatment of mice with a Ca^{2+} antagonist decreases agouti-induced obesity.

Regulation of food intake by the neuropeptide Y (NPY)/Agouti-related protein (AgRP) neurons of the hypothalamic arcuate nucleus is an area of active investigation [27,28,29]. Recently [18], it was discovered that the prevalence of obesity is paradoxically much lower in cannabis users as compared to non-users and that this difference is not accounted for by tobacco smoking status and is still present after adjusting for variables such as sex and age.

Here, we propose that this effect is directly related to exposure to the D⁹-tetrahydrocannabinol (THC) present in cannabis smoke. We therefore propose the seemingly paradoxical hypothesis that THC or a THC/cannabidiol combination drug may produce weight loss and may be a useful therapeutic for the treatment of obesity and its complications.

On studying the relation between BMI and appetite regulating hormones, it was found that in cannabis smokers there is no correlation between plasma leptin concentrations and BMI in comparison to significant positive correlation between them in non cannabis smokers. It was found also that cannabis smoking had modulated the statistically significant inverse correlation between plasma AgRP concentrations and BMI in non cannabis smokers to be insignificant inversely correlation between them. These findings are consistent with modulation of appetite hormones mediated through endogenous cannabinoid receptors as previously concluded by [30], whose study results showed that cannabis administration was associated with significant increases in plasma levels of ghrelin and leptin, and decreases in PYY, but did not significantly influence insulin levels and these findings are consistent with modulation of appetite hormones mediated through endogenous cannabinoid receptors, independent of glucose metabolism.

It is demonstrates that [31] agouti directly up regulates adipose tissue leptin as well as plasma leptin and ob mRNA levels. Since agouti is normally expressed in human adipose tissue. In addition, they indicate, "Agouti may function as an autocrine regulator of leptin in human adipocytes. This is the first report of regulation of an obesity gene product by another obesity gene product, suggesting that interaction between obesity genes may play a key role in obesity syndromes.

AgRP could antagonize leptin action by antagonism of MC4-R. It is also, reported that AgRP is unregulated in the Arc from leptin-deficient o b/o b mice and leptin receptor deficient db/db mice, suggesting that leptin may, in turn, regulate hypothalamic AgRP production. All the findings suggest resence of complex interactions between leptin and AgRP to elucidate the role of AgRP in leptin action [7,24,32].

So we can confirm that AgRP may play an important role in affecting plasma leptin concentration this regard may give us a clue to understand the mechanism of leptin resistance, the MCR signaling system is a key regulator of body weight. Profound obesity develops leptin level that leads to activated in MC4R, when the gene

encoding the MCR ligand D-MSH is activated, or when AgRP can't antagonist the MC3/4R, that leads to decrease in AgRP expression in the hypothalamus".

Leptin signaling can influence 2AG (2-arachidonoyl glycerol) biosynthesis in the hypothalamus and anandamide hydrolysis in T-lymphocytes [33]. CB1 is located mostly presynaptically allowing for retrograde action of endocannabinoids. CB1 signaling affects the expression of oreigenic and anorectic mediators in the hypothalamus. In the hypothalamus, changes in endocannabinoids levels seemed to be inversely correlated with the changes that are known to occur in blood vessels of the neurohormone leptin, which is pivotal in regulating the hypothalamic orexigenic and anorectic signals. Indeed, leptin decreases endocannabinoid levels in the hypothalamus, much as it does for other orexigenic mediators, and obese rodents with defective leptin signaling show significantly higher hypothalamic endocannabinoid concentrations [34].

Endocannabinoids may play an integral role in the leptin pathway, which may be the key to understanding their role in appetite stimulation. Leptin is the main signal in which the hypothalamus senses nutritional state and modulates food intake. In one study, a defective leptin signaling pathway resulted in increased levels of hypothalamic endocannabinoids which points to a strong association between the leptin signaling pathway and the endocannabinoid system and this suggestion may agreed with [34].

Cannabinoid type 1 receptor-mediated appetite stimulation by D9 tetrahydrocannabinol (D9THC) is well understood. Recently, it has become apparent that at least one of non-D9THC phytocannabinoids could definitively stimulate feeding, although further trials using individual phytocannabinoids are required to fully understand the observed effects [35].

6. CONCLUSION

It can be concluded that there is a possible link between endocannabinoid mechanisms and the appetite-regulating hormones and that smoking cannabis, increases food intake by affecting the relation between plasma leptin concentration, and plasma Agouti related protein concentrations.

Leptin and AgPR hormones may be consider as smoking cannabis markers when there was not any other effects on these hormones.

CONSENT

Both authors declare that 'written informed consent was obtained from the participants for sample collection for research and publication.

ETHICAL APPROVAL

Both authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Sex Determination Potential from Canine Tooth Dimensions

ABSTRACT

Aims: This study was conducted to know sex determination potential from mesiodistal dimensions of permanent canines.

To find out the average size of canines in males and females of south Indian population.

To compare the findings with National and International Studies.

Study Design: The subjects were selected based on the inclusion and exclusion criteria set forth for the study. Measurements of mesiodistal widths of the four canines were made on the dental casts of each of the 600 subjects with Digital caliper with 0.01 resolution and subjected to statistical analysis. Statistical methods used were statistical mean, standard deviation, Student's t-test ($p < 0.05$), step-wise discriminant analysis and cross validated discriminant analysis using SPSS version 11.00.

Place and Duration of Study: Department of Oral Medicine and Radiology, Al-Badar Rural Dental College and Hospital, Gulbarga, Karnataka, India, between May 2008 and May 2011.

Methodology: We included 600 patients (300 men, 300 women; age range 17-25 years).

Results: The mesiodistal width of canines of both the jaws is significantly greater in males than females.

The mean maxillary canine width in males and females is 7.73 mm. The mean mandibular canine width in males and females is 6.825 mm.

The mean (male and female), maxillary and mandibular canine width is found to be less in South Indian Population as compared to Central Indian population.

The mean (male and female), maxillary and mandibular canine width is found to be less in South India Population as compared to values given by Wheelers and similar to the study done in the Saudi population.

Conclusion: The present study measured only linear dimensions because of simplicity, reliability, inexpensibility and in a setup where latest technology utilizing DNA methods are not available and gender estimation has to be managed based on jaw fragments.

Keywords: canines dimorphism; sex determination; gender; forensic odontology.

ABBREVIATIONS

SD=Standard deviation; Min=Minimum; Max=Maximum; Signi.=Significance.

1. INTRODUCTION

Human beings are born with an identity and deserve the right to die with an identity [1]. Identity means the determination of the individuality of a person [2]. United Nations Declaration of Human Rights states that every freeborn person has the right to be identified even after death [3,4]. The identification of a dead body may be required in cases of sudden and unexpected death, fires, explosions, railway or aircraft accidents, mutilated or hidden decomposed bodies, or foul play and often needs great medico-legal acumen [2]. The law enforcement community expects and requires that forensic scientist report the identification of partial or complete remains of an individual to the best of his or her ability [5]. Various methods are used to establish the identity of unknown remains. The reliability of each method varies [1]. The methods vary and depend on the available bones and their condition [6]. The only method that can give a totally accurate result is the DNA technique, but in many cases and for several reasons it cannot be used [2,6].

Gender determination of skeletal remains is part of the archaeological and many medico legal examinations [6]. An important initial step in identification of the dismembered remains of mass disaster victims is the separation of sexes [7]. Complete skeletons with or without soft tissue present fewer problems. Those bodies, which are, less complete and consisting of parts of a skeleton only, present more

problems in identification and in many instances may not be identified at all [8]. Anthropological measurements of the skeleton and the comparison with the existing data must then be applied and may help to differentiate between male and female remains [6]. Osteometry is considered the preferred technique because it is more effective in determining sex [9]. On an individual basis however, gender differences are always distinctive, but taken collectively can give a good indication in majority of the cases [6]. The determination of sex is among the important aspect of forensic anthropology. These characteristics display population specific variation and therefore, need further attention for major populations of the world [10].

Many authors have done the measurements of crown in teeth between males and females and found certain variations. Though the morphology of the structure is similar to male and female, there is no need that, the size of the structure should remain same, as the size of structure is determined by various factors like exercise, nutrition, metabolic activities etc. Measurements of tooth dimensions are quick, less time consuming, non-invasive and can be easily performed compared to DNA technique.

The study aims to fulfill the following objectives:

Determination of sex by measuring Mesiodistal dimension of maxillary and mandibular permanent canines.

To find out the average size of canines in males and females of south Indian population.

To compare the findings with National and International Studies.

2. MATERIALS AND METHODS

This study was conducted in the Department of Oral Medicine & Radiology, Al-Badar Rural Dental College & Hospital, Gulbarga, Karnataka, India the ethical approval for which was taken from Institutional Review Board.

The study population constituted 300 males and 300 females in the age group of 17 to 25 years, reporting to the Department of Oral Medicine & Radiology, Al-Badar Rural Dental College & Hospital, Gulbarga, Karnataka, India.

The subjects for the study were selected based on simple random sampling technique and those who willingly consented to be a part of the study with following inclusion & exclusion criteria & the legal age of the subject was confirmed using one

of following documents: birth certificate, driving license, college or other identity card, 10th class certificate.

2.1 Inclusion Criteria

The subjects having complete set of fully erupted, morphologically well-formed, periodontally healthy, non-carious, non-attributed, intact and satisfactorily aligned maxillary and mandibular teeth with Angle's class I Malocclusion and no history of orthodontic treatment and no evidence of cleft palate or crown restorations were included in the study.

2.2 Exclusion Criteria

1. The Individuals who wear bridges, crowns and other appliances or had any anomalies that could influence the measurements.

2. Conservative treatment other than Class I occlusal restorations and class V on teeth other than canine.

3. Individuals with anodontia, partially edentulous, malformed/hypoplastic teeth and positional variations in any of the segments.

Individuals with clinical features suggestive of developmental disturbances, metabolic disorders, history of prolonged illness and medically compromised states were excluded from the study.

An informed written consent was obtained from each of the subjects followed by full arch maxillary and mandibular impressions were taken by Irreversible Hydrocolloid impression material (Hydrogum soft; Zhermack clinical, Germany) and poured immediately by Type III Gypsum product, dental stone (Stone plaster; Neelkanth Healthcare Pvt. Ltd, India).

The following parameters were determined on casts by using electronic digital sliding caliper to the nearest 0.01 mm (Mitutoya Co., Utsunomiya, Japan).

Mesiodistal crown width of right maxillary canine;

Mesiodistal crown width of left maxillary canine;

Mesiodistal crown width of right mandibular canine;

Mesiodistal crown width of left mandibular canine.

Intra-observer reliability or precision (differences between the repeated measurements) and inter-observer errors (differences between the means of two sets measurements) were 0.08 mm and 0.16 mm, respectively; representing only 1.2% and 2.1% of the mean measurements.

The readings obtained were subjected for analysis to derive conclusions. Sexual dimorphism in right and left mandibular and maxillary canines was calculated using a formula given by Garn et al. [11].

Sexual dimorphism = $[(x_m/x_f)-1] \times 100$ x_m =mean value for males; x_f = mean value for females.

The results obtained were subjected to statistical analysis (Mean, Standard deviation and coefficient of variation, t-test, step-wise discriminant analysis and percentage accuracy of reporting gender identity by cross validated discriminant analysis and computed for both sexes using SPSS (Statistical Package for the Social Sciences) Version 11.00.

3. RESULTS

It was observed that the mean value of the mesiodistal crown width of right maxillary canines was 7.90 ± 0.54 mm in males and 7.60 ± 0.37 mm in females, while the mean value of the mesiodistal crown width of left maxillary canines was 7.85 ± 0.64 mm in males and 7.60 ± 0.37 mm in females (Table 1). The differences in these values are statistically significant ($P < 0.001$).

The mean value of the mesiodistal crown width of right mandibular canines was 7.00 ± 0.31 mm in males and 6.65 ± 0.55 mm in women and the mean value of the mesiodistal crown width of left mandibular canines was 7.00 ± 0.32 mm in the males and was 6.65 ± 0.55 mm in females (Table 1). The differences in these values are statistically significant ($P < 0.001$).

Table 1. Mesiodistal crown width of maxillary and mandibular canines – genderwise distribution in mm

Variable	Gender	Min (in mm)	Max (in mm)	Mean (in mm)	SD	t-value	p-value
Maxillary Right Canine	Male	7.0	9.0	7.9000	0.5394	7.9108	<0.0001
Maxillary Right Canine	Female	7.0	8.0	7.6000	0.3748		
Maxillary Left Canine	Male	7.0	9.0	7.8500	0.6355	5.8692	<0.0001
Maxillary Left Canine	Female	7.0	8.0	7.6000	0.3748		
Mandibular Right Canine	Male	6.5	7.5	7.0000	0.3168	9.5394	<0.0001
Mandibular Right Canine	Female	6.0	7.5	6.6500	0.5509		
Mandibular Left Canine	Male	6.5	7.5	7.0000	0.3168	9.5394	<0.0001
Mandibular Left Canine	Female	6.0	7.5	6.6500	0.5509		

*SD=Standard deviation; Min=Minimum; Max=Maximum; Signi.=Significanc; mm=Millimeter

The sexual dimorphism from the mesiodistal crown width of the canine tooth was calculated by the formula $X_m/X_f-1 \times 100$; X_m is the mean mesiodistal width of canines in men and X_f is the mean mesiodistal width of canines in women.

The sexual dimorphism of right maxillary canines was 3.947% and that of left maxillary canines, 3.28% and the sexual dimorphism was 5.263% for the right mandibular canine and 5.263% for the left mandibular canine.

We derived the mean measurement of right and left maxillary canines for males and females and mean of these measurements were taken to arrive at a single value for maxillary canine. Similarly one single value was measured for mandibular canine. These values were compared with the values given by Wheeler's [12]. (Table 2 & 3). Both the maxillary and mandibular canine measurements in the present study were found to be less than the Wheeler's. This finding is very important as it indicates that normative data based on one population cannot be used for other population.

Table 2. Comparing maxillary canine width with the Wheeler's study results

Maxillary canines	Male right (in mm)	Male left (in mm)	Female right (in mm)	Female left (in mm)
Mean	7.90	7.85	7.60	7.60
Maxillary right, left mean	7.875		7.60	
Combined male female mean	7.73			
According to Wheeler	7.5			

Table 3. Comparing Mandibular canine width with the Wheeler's study results

Mandibular canines	Male right (in mm)	Male left (in mm)	Female right (in mm)	Female left (in mm)
Mean	7.00	7.00	6.65	6.65
Mandibular right, left mean	7.00		6.65	
Combined male female mean	6.825			
According to Wheeler	7.0			

Comparing the mean canine measurement of our findings with other studies, the values of our study on South Indian population are similar to the other studies (Table 4).

Table 4. Comparison with other studies

Author	Year	Population	M/F	MxRt (mm)	Mxlt (mm)	Mn Rt (mm)	Mn lt (mm)
Present study	2014	South Indian	M	7.90	7.85	7.00	7.00
			F	7.60	7.60	6.65	6.65
Madhavi Yuwanati [20]	2013	Central Indian	M	8.04	8.32	7.76	8.01
			F	7.73	8.01	7.44	7.74
Gorea & Sharma [27]	2010	North Indian	M	7.61	7.67	6.78	6.71
			F	7.31	7.39	6.39	6.41
Karan Boaz [19]	2009	South Indian	M			7.05	6.98
			F			7.00	6.90
Kaushal [15]	2004	North Indian	M			7.32	7.198
			F			6.69	6.67
Mohd QA & Abdulla [28]	1997	Saudi	M	7.53	7.53	6.90	6.93
			F	7.55	7.36	6.83	6.80

4. DISCUSSION

Teeth form an excellent material in living and non-living populations for anthropological, genetic, odontogenic and forensic investigation. Measurements of tooth dimensions are quick, less time consuming, non-invasive and can be easily performed. Tooth dimensions are used to establish the sex of a victim in major accidents/disasters, medico-legal cases and natural disasters. Sex can be determined well in mature individuals if the human skeletal remains are intact [2].

The dentition takes precedence particularly when preferred parameters such as the pelvis are unavailable and cranial and long bones fragmentary. However, linear tooth measurements usually give moderate levels of accuracy in sex identification [3,4]. Two approaches to sex identification have been described. The first is based on a visual assessment of the shape or relative proportions of sexually dimorphic features. The second is a metric approach, which offers advantages over the visual approach as it is inherently more objective, has higher reliability, is less dependent on the previous observer experience and is more readily amenable to statistical analysis and thus helps comparisons within the sample as well as with previous studies [5]. The present study was based on the second approach of sex identification and the advantages quoted for the metric method hold good for it too. This study was intended to analyze the sexual dimorphism in the maxillary and mandibular permanent canines. Permanent canines were considered as the canines erupt by the age of 12 years with mean age of eruption being 10.87 years [6] and canines are less affected than other teeth by periodontal disease [7,8] and are the last teeth to be extracted with respect to age [9]. Canines are also better likely to survive severe trauma, such as air disasters, hurricane and accidents. The present study utilized a Vernier Caliper with

0.01 mm resolution. Since the anatomic landmarks are standardized and the instruments calibrated, little variation may be expected in the measurements. In other words, the values reported may be comparable to previous studies. The measurements were made on the dental casts of all the subjects. It is advantageous to measure the tooth dimensions on the casts as they may be examined at a later date to eliminate errors due to fatigue during measurements. Also, it provides convenience for the second investigator to make measurements at a later date.

Garn et al. [13] revealed the magnitude of sexual dimorphism in tooth size as well as percentage dimorphism in 117 subjects from Southwest Ohio, representing 75 families. The largest sexual dimorphism in mesiodistal tooth size was exhibited by the mandibular first and second molars, 7% and 6.2%, respectively, with the mandibular and maxillary canines next in order with 6.2% and 6%, respectively. On percentage basis, dimorphism was greatest for canines and least for mandibular incisors. But canine dimorphism was specific to mesiodistal diameter. Mesiodistally the lower canines showed the greatest difference between the sexes.

Lysell and Myrberg [14] studied the records of 530 boys and 580 girls who were born to Swedish parents and grew up in the Stockholm area, and reported expression of sexual dimorphism in the deciduous dentition as well as in the permanent dentition. Boys exhibited larger mesiodistal tooth widths than girls in both deciduous and permanent dentitions. The largest male and female tooth widths were found in permanent canines (5–6%).

Kaushal et al. [15] found a statistically significant dimorphism in the mandibular canines in 60 subjects in a North Indian population, where the mandibular left canine was seen to exhibit greater sexual dimorphism. They also concluded that if the width of the canine is greater than 7 mm, the probability of the sex of the person under consideration being male was 100%.

Hashim and Murshid, [16] conducted a study on Saudi males and females in the age group of 13-20 years to determine the teeth in human dentition with the highest likelihood of dimorphism and found that only the canines in both the jaws exhibited a significant sexual difference while the other teeth did not. In a continuation of the same study, they also determined that there was no statistically significant difference between the left and right sides suggesting that measurements of teeth on one side could be truly representative when the corresponding measurements on other side was unobtainable.

Schild et al. [17] observed sexual difference in tooth size among American black, European and Mongoloid populations. The degree of sexual dimorphism of mandibular canine width was more in Ohio Caucasians and Australian aborigines than in Pima Indians and Tristanite population [11].

Acharya and Mainali [18] found reverse dimorphism in the mesiodistal dimension of mandibular second premolar in Nepalese population. The finding could be attributed to evolution resulting in a reduction in sexual dimorphism, causing an overlap of tooth dimension in modern males and females. Similar finding was observed by Karen Boaz and Chaavi Gupta [19] in a dimorphic study of maxillary and mandibular canines in 100 subjects in South Indian population and revealed the lack of significant dimorphism in canines and also the finding of reverse dimorphism where the females exhibited larger canines than males.

Madhavi yuwanati et al. [20] conducted a study on 100 cases in 17-21 years in central Indian population with mean maxillary canine width in males and females was 8.02 mm and the mean mandibular canine width in males and females was 7.73 mm.

In this study an attempt has been made to establish the sex of a person by using the mesiodistal width of canine teeth in the Karnataka population.

In our study, there were no significant differences between the mesiodistal width of right and left, mandibular and maxillary canines among males. Similar observations were made among the female counterparts. These findings were in agreement with the studies conducted by Kaushal et al. [15] Garn et al. [11] Al-Rifaiy et al. [21] Acharya and Mainali, [18] and Anderson and Thompson [22].

The mean mesiodistal width of the right and left mandibular canines in our study was found to be greater in males (right: 7.00 ± 0.31 mm; left: 7.00 ± 0.32 mm) than in females (right: 6.65 ± 0.55 mm; left: 6.65 ± 0.55 mm), which was statistically significant with a *P*-value of <0.001 . This greater dimension of mesiodistal width of canines in males can be attributed to the Y chromosome, which is responsible for the thickness of dentine, contributing to the width of a tooth [18,22]. These findings are in agreement with the studies conducted by Kavitha [23] (males: 7.2–7.9 mm and females: 6.7–7.6 mm) for the Tamil Nadu population (South India), Kaushal et al. [15] (men: right 7.22 ± 0.28 mm; left 7.29 ± 0.29 mm and women: right 6.69 ± 0.25 mm; left 6.69 ± 0.32 mm) for the North Indian population and by Acharya and Mainali [18] (Males: right 6.96 ± 0.39 mm; left 7.00 ± 0.4 mm and Females: right 6.58 ± 0.35 mm; left 6.63 ± 0.35 mm) for the Nepalee population on mandibular canines.

However, the studies conducted by Ates et al. [24] and Al-Rifaiy et al. [21] on Turkish and Saudi populations did not find significant gender differences for the mesiodistal width of mandibular and maxillary canines.

The value for sexual dimorphism of maxillary canines in our study was 3.947% for the right canine and 3.289% for the left canine similar to the study done by Bakkannavar et al. [25] (3.31% right canine; 3.29% left canine). The study conducted by Garn et al. on the Tristanite population showed the sexual dimorphism for maxillary canines to be 2.5%, which has lower dimorphic value than our study. However, Garn et al.'s study on different ethnic groups revealed the value to be 4.5% for Australian Aborigines, 5.3% for Pima Indians and 5.9% for Ohio Caucasians [11]. Their study showed the combined value for both canines.

In our study, the value for sexual dimorphism of mandibular canines was 5.263% for the right canine and 5.263% for the left canine as compared to the study done by Bakkannavar et al. (4.50% right canine; 4.61% left canine) [25], Garn et al. on the Tristanite population (4.1%) [11]. Garn et al.'s study further reported the values for sexual dimorphism in Ohio Caucasians (6.4%), Australian Aborigines (6.8%) and Pima Indians (6.3%). The higher sexual dimorphism values, 6.2% (right canines) and 7.7% (left canines), were computed for the South Indian population by Nair et al. [26] and 7.954% for the right canines and 8.891% for the left canines computed for the North Indian population by Kaushal et al. [15]. The higher values obtained in their studies could be attributed to the small sample size and use of dental casts for their study. The mandibular canines are considered to demonstrate the greatest percentage of sexual dimorphism among all teeth in their mesiodistal width [15,11,23].

5. CONCLUSION

The present study measured only linear dimensions because of simplicity, reliability, inexpensibility and in a setup where latest technology utilizing DNA methods are not available and gender estimation has to be managed based on jaw fragments. The mandibular canine index may also be used as an adjunct to enhance accuracy.

5.1 From the Present Study We Can Conclude That

- The mesiodistal width of canines of both the jaws is significantly greater in males than females.

- The mean maxillary canine width in males and females is 7.73 mm. The mean mandibular canine width in males and females is 6.825 mm.
- The mean (male and female), maxillary and mandibular canine width is found to be less in South Indian Population as compared to Central Indian population.
- The mean (male and female), maxillary and mandibular canine width is found to be less in South India Population as compared to values given by Wheelers and similar to the study done in the Saudi population.

Further investigations are desired with larger samples and in populations of varied ethnic origin in the direction of improving accuracy of using linear dimensions of teeth as a method of sex identification.

CONSENT

Not applicable.

ETHICAL APPROVAL

This study was approved by the Ethical Research Board of the Institution.

ACKNOWLEDGMENTS AND DISCLOSURE STATEMENTS

This study was done as part of a dissertation submitted to Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India for the award of an MDS degree in Oral Medicine and Radiology.

The authors would like to thank Dr. Girish Katti (Head Of Department, Oral Medicine & Radiology, Al-Badar Rural Dental College, Gulbarga, Karnataka, INDIA) for his help in the course of the study.

The authors report no conflicts of interest related to this study and this article is not published in any other journal. No financial disclosure to be made.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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The role of conditionally-pathogenic cocci in the formation of placental insufficiency

Abstract: Placental insufficiency at the present stage is the main cause fetal growth retardation, his injuries during childbirth. According to various literature placental insufficiency occurs in 30-45%, and among pregnant women with a history of obstetric - gynecological diseases to 75%. Conducted research allowed for practical analysis of placental infection in 30 cases of complicated pregnancy, experimentally proved the importance of opportunistic cocci, when forming fetoplacental failure.

Keywords: perinatology, fetoplacental insufficiency, gestation, infection, DIC.

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Роль условно-патогенных кокков при формировании фетоплацентарной недостаточности

Аннотация: Плацентарная недостаточность на современном этапе является основной причиной задержки развития плода, его травм в процессе родов. По данным различных литературных источников плацентарная недостаточность встречается в 30-45%, а среди беременных с отягощенным акушерско-гинекологическим анамнезом до 75%. Проводимое исследование позволило провести практический анализ плацентарного инфицирования в 30 случаях осложненной беременности. экспериментальным путем обоснована значимость условно-патогенных кокков, при формировании фетоплацентарной недостаточности.

Ключевые слова: перинатология, фетоплацентарная недостаточность, гестация, инфицирование, ДВС-синдром,

Актуальность исследования. В современных условиях фетоплацентарная недостаточность является рискообразующим фактором, по разным исследованиям, в 28-45% случаях. Беременность и роды у пациенток с ФПН протекают с высокой частотой осложнений. Морфологическими особенностями последа у женщин является наличие признаков альтерации - в 53,1% и воспаления – в 89,2%. Признаки внутриутробного инфицирования имеются в 82,9%, фуникулита – в 18,8% случаев, который во всех случаях сопровождается реализацией внутриутробной инфекции.

Не понимая до конца механизмов формирования изменений, происходящих в единой функциональной системе «мать-плацента-плод» на протяжении от начала беременности до родоразрешения, не возможно проводить верную акушерскую тактику при осложненном течении гестации [1]. Маточно-плацентарный кровоток является важнейшим элементом, который соединяет организм матери и ребенка. Изменения кровотока предшествуют возможным нарушениям развития беременности. Вариации изменений, происходящие во время гестации, не всегда сопровождаются нарушением функционального состояния плаценты и отклонением в состоянии плода. Вместе с этим, именно раннее и своевременное выявление нарушенного состояния плода позволяет правильно определиться с выбором корректной превентивной и патогенетической терапии, а также с правомерной акушерской тактикой в конкретном клиническом случае [2].

Плацента является системой внутриутробного жизнеобеспечения плода и на протяжении беременности проходит полный жизненный цикл, включающий

зарождение, развитие, функциональный расцвет и старение [3]. При наличии инфекции у матери плацента является барьером по отношению к плоду на пути экзогенного инфицирования [4]. Следует отметить, что, данные литературы о диссеминации инфекции в послед с дальнейшим развитием плацентита, как от-правного звена в развитии ряда акушерских осложнений, разнятся.

На основании клинико-морфологической картины выделяют первичную и вторичную ФПН. Первичная ФПН возникает в ранние сроки беременности при формировании плаценты (имплантация, эмбриогенез, плацентация) под влиянием различных неблагоприятных факторов (генетические, эндокринологические, инфекционные и т.д.). Анатомически это проявляется изменениями в строении, расположении в матке и прикреплении плаценты, а также дефектами васкуляризации и нарушениями созревания ворсинок хориона.

Целью настоящего исследования явилась исследование плаценты и выявление патогенных факторов, приводящих к ФПН, преимущественно вызванных условно-патогенными кокками.

Гипотеза исследования: послед обладает высоким информативным потенциалом и является важнейшим диагностическим объектом, полученная при его исследовании информация совершенно необходима для полноценного патоморфологического заключения о причинах, механизме близких и отдаленных последствиях патологии беременности. Исследование последов является одним из резервов, позволяющих влиять на снижение количества летальных исходов, инвалидизирующих заболеваний, позволяя выявлять инфекционные поражения и связанные с ними варианты плацентарной недостаточности и патологической незрелости плаценты. Установление особенностей течения беременности и факторов риска очень ранних преждевременных родов, изучение характера морфологических изменений последа, определение наиболее значимых цитокинов в сочетании с цервикометрией будет способствовать более точной диагностике ФПН, особенно в группах риска по невынашиванию беременности, своевременному изменению тактики ведения таких пациенток.

Материалы и методы исследования. На базе ГБУЗ районной больницы Камчатского края проведен анализ результатов клинического и бактериологического обследования плаценты. Материалом для проведения исследовательской

работы стало изучение плаценты 30 женщин с восходящим инфицированием последа. Проводилось макроскопическое и микроскопическое исследование последов.

Таблица 1. Статистика выявленных случаев инфицирования

Разновидность выявленного инфицирования	Общее число	в %
Уреаплазма	15	50
Хламидии	25	84
Микоплазма	11	36,7
Гонорея	1	1,3
Энтэрококковая инфекция	13	44
Стафилококк	5	18
Кандиды	16	52,7
Герем-вирусная инфекция	2	5,3
Папилома вирус	2	8

Самым распространенным видом инфицирования являются хламидии, которые составляют 84% из всех обследованных, уреаплазма выявлена у половины обследованных женщин. микоплазма - 36,7%. Особое следует выделить энтэрококковую инфекцию, которая наблюдается у 13 беременных женщин. Стафилококк выявлен в 18% исследований. Высокие риски инфицирования представляют кандиды (52,7%).

При макроскопическом исследовании толщина плаценты равномерно снижалась от центра к периферии, оболочки плодного яйца имели блестящий белесо-серый цвет, форма в основном была округлой, однако 6 из 64 плацент имели неправильную форму за счет неровных контуров и дополнительных долек. Кроме того, обнаружено нарушение локализации плаценты в 21,9% случаев, что косвенно может указывать на патологические изменения в эндометрии связанные с воспалением как в полости матки, так и на её шейке, или оперативными вмешательствами, такими как выскабливания или кесарево сечение.

Признаки незрелости последа, такие как мезенхимальные ворсины, эмбриональные ворсины, промежуточные незрелые ворсин, зрелые промежуточные ворсины, были обнаружены в 15,6% случаев (таблица 3).

Представим результаты исследования на диаграмме:



Рисунок 1. Статистика выявленных инфекций

В основе любого из перечисленных вариантов ворсин лежит прекращение дальнейшего развития ворсинчатого хориона, обусловленного воздействием разнообразных патогенных факторов. Эти патологические варианты приводят к преждевременным родам в большинстве случаев. Патоморфологи, констатируя вариант незрелости ворсин, могут указать на время патогенного воздействия на плод, что поможет в профилактике преждевременных родов в будущем у данной пациентки. Патологическая незрелость ворсин обнаружена в 15,6%.

Таблица 2. Частота выявления признаков патоморфологии последа при преждевременных родах (в %; n=64)

Патоморфология последа	%
Признаки незрелости последа	15,6
Очаги инфарктов	6,3
Патологическая незрелость ворсин	15,6
Облитерационная ангиопатия	20,3
Склероз ворсин	9,4
Диссоциированное созревание ворсин	7,8

Очаги инфарктов в плаценте обнаружены в 6,3%. Инфаркты выявлялись в виде узелков на поверхности и в паренхиме плаценты величиной от зерна до куриного яйца. Инфаркты относятся к инволютивно-дистрофическим изменениям, возникшим в результате тромбозов плодных сосудов. Ангиоматоз, как основа нарушения кровотока в артериях пуповины, хориальной пластинки и опорных ворсин, является базовым морфологическим признаком хронической фетоплацентарной недостаточности.

В основе формирования ФПН лежат нарушения компенсаторно-приспособительных механизмов организма беременной женщины и плаценты, сопровождающиеся циркулярными расстройствами и нарушениями микроциркуляции [6]. В этиологии ФПН невозможно выделить ведущий или единственный компонент, чаще это бывает сочетание нескольких факторов, т.е. данное патологическое состояние имеет мультифакторную природу [7].

Терапия ФПН должно быть комплексной, направленным на купирование патологического процесса и устранение нарушений ФПС. Лучшие результаты лечения в отношении роста плода наблюдаются при его раннем начале – в конце первого и начале второго триместрах беременности. Терапия, проводимая после 35 недели гестационного периода, может улучшить состояние плода, но не оказывает влияние на его рост. Беременной с ФПН рекомендован щадящий режим с обязательным дневным сном, а также соблюдение диеты, которая должна содержать большое количество белка в виде мясных и рыбных продуктов, молока и творога, овощей и фруктов.

Лечение следует начинать с устранения или уменьшения отрицательного воздействия на структуру и функцию плаценты, осложнений беременности и экстрагенитальных заболеваний. Таким образом, как следует из вышеизложенного, фетоплацентарная недостаточность является важной медико-социальной проблемой современной медицины. Необходимо дальнейшее изучение влияния различных внешних и внутренних факторов на развитие фетоплацентарной недостаточности, а также разработка эффективных методов терапии указанной патологии гестационного периода.

Приведенные данные, обосновывают необходимость проведения прегравидарной подготовки у пациенток с инфекционным патогенезом, а также тщательного наблюдения за формированием и функционированием фетоплацен-

тарного комплекса и проведения адекватных лечебных мероприятий для снижения степени неблагоприятного влияния проблем инфицирования на течение беременности и ее исход.

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Unusual manifestation of intranatal contamination in children

Abstract: Human parasitic diseases (protozooses and helminthiases) present a global problem due to their almost universal spread. Helminthiases constitute a large group of parasitic diseases caused by helminths (parasitic worms), which significantly affects public health. In Primorsky region (Russian Federation) helminthiases account for 69.7%, and protozooses account for 30.3% of all parasitiases structure. Up to 80.0% of the total amount of revealed cases of parasitic diseases is represented by invasions passed with the fish. Only 3.0% of cases are associated with nanophytiasis, metagonimosis, anisacidosis, paragonimosis, teniasis, taeniarhynchiasis, as well as echinococcosis and dirofilariasis. The article presents a case report of a patient with helminthiasis of unknown origin. One-month-old girl developed acute dyspeptic syndrome, symptoms of allergy, and intestinal disorders. The patient was admitted to the Children’s infectious department. Taking into account weight loss of 220 g during the first month of life despite breast feeding on demand and sufficient amount of mother’s milk, as well as laboratory examination results (high blood EOS count – up to 8%), and the fact of helminth emergence from the anus with total body length of about 70 cm in the form of narrow grey band 1-2 mm in diameter an impression was made of cestodiasis invasion, specifically beef tapeworm infection (taeniarhynchosis) with juvenile immature helminth. On treatment with a single dose of Tab. Prazikvanteli 10 mg/kg

(40 mg) the patient improved. The presented case strongly suggests that parasitic invasions are quite common in pediatric population and may occur even in infants.

Keywords: parasitoses, rare helminthiasis, infant, case history.

1. Introduction

Active studies of bacteria and viruses have to some extent put on the back burner the diseases caused by highly organized pathogens – protozoa and helminthes. However human parasitic diseases (protozooses and helminthiasis) present a global problem due to their almost universally spread [1]. Helminthiasis constitute a large group of parasitic diseases caused by helminths (parasitic worms), which significantly affects public health [2]. Epidemiological situation of helminthiasis in Primorsky region depends largely on ecologic and parasitologic state of human environment [3]. In Primorsky region parasitoses cover 14.0% in the overall structure of infectious diseases (without influenza and acute respiratory infections). Of them helminthiasis account for 69.7%, and protozooses account for 30.3%. Up to 80.0% of the total amount of revealed cases of parasitic diseases is represented by invasions passed with the fish. Only 3% of cases are associated with nanophyotiasis, metagonimosis, anisacidosis, paragonimosis, teniasis, taeniarhynchiasis, as well as echinococcosis and dirofilariasis [4].

Commonly clinical presentation of helminthiasis is obscure. Furthermore all of them are characterized by similar symptoms. In acute early phase of invasion immediate or delayed hypersensitivity reaction usually develops to helminth larvae committing its complex and long-lasting migration in the human body [2]. However it should be noted that methods of parasite identification and determining of acquisition way in Primorsky region do not meet current requirements and are far from ideal. In this paper we present a case history of a patient with helminthiasis of undetermined etiology.

2. A case history

One-month-old infant girl P. (date of birth 05 May 2015; hospital chart № 102317) was admitted to the Children's infectious department No. 1 of Regional state autonomous health care institution "Vladivostok Clinical Hospital No. 2" on June 09, 2015. On admission infant's mother complained of child's motor anxiety, episodes of regurgitation, diarrhea with mucous and green stools, and diaper rash in the inguinal regions. From May 30, 2015, the child was administered Smecta for frequent episodes of regurgitation. On June 03 allergic rash appeared across the whole skin surface. On

June 4, 2015 the main complaints developed which led to hospitalization. Until hospitalization the child received symptomatic treatment.

Past medical history: Patient's parents are healthy. Mother's anamnesis: gravida 3/para 2/abortus 1. Previous pregnancies: I – healthy girl was born; II – legal abortion. At week 20 of the present pregnancy mother was diagnosed with progressive medication-resistant anemia. She complained of irritation, insomnia, feeling of numbness in the upper extremities, especially in the finger tips, creeping sensation, tingling, burning, "marbled skin" of the extremities, cramps, and general symptoms of asthenia. Given these symptoms she was examined by neurologist at weeks 24 and 38 of the present pregnancy, no abnormality having been revealed.

Baby was born by vaginal delivery at term. Birth weight 3920 g, birth body length 54 cm. Umbilical cord remnant fell off on the third day of life. Neonatal period was unremarkable. At the age of 5 days the baby was discharged from maternity clinic. BCG vaccination was given in the maternity clinic. No other vaccination was performed thereafter. There was no prior history of allergy. Cradle cap is absent.

Epidemiological anamnesis: The baby lives in a comfortable flat. She is breast-fed. Ethnicity: – Russian.

Physical examination: general state is poor due to intoxication symptoms and intestinal dysfunction. T 36.6°C. Conscious is clear. Constitution is normal. The baby is wasted. Body weight on admission is 3700 g. Musculoskeletal system is without any apparent abnormalities or deformities. Frontal fontanelle: 0,5×0,5 cm. Chest is cylindrical. Skin is very pale and moderately wet. On the face and body there is maculopapular allergic rash, prone to confluence. In the perineal region on the buttock and labia majora skin there is extensive diaper rash in the form of hyperemia and oozing lesions as well as oozing lesions around anus. Sclerae are clear. Oropharynx appears with light diffuse hyperemia and nonsignificant granulosity of posterior pharyngeal wall. Plaques are absent. Peripheral lymph nodes are not enlarged. Nasal breathing is normal. RR 42 per 1 minute. Percussion reveals clear vesicular resonance. Respiration is puerile without rales. PS is 146 per minute, rhythmic. Precordial region is not changed. Borders of relative heart dullness are within normal limits. Heart sounds are clear and regular. Heart murmurs are absent. HR 146 b.p.m. Abdomen has normal form, participates actively in respiratory movements, with tympanitic resonance on palpation. Liver is elastic and does not protrude below the costal margin. Spleen is not enlarged. Stool

has mucous, green, and undigested inclusions. Symptom of costovertebral angle tenderness was not assessed due to early age of the patient. Urination is unobstructed and rare. Urine has yellow color. Meningeal symptoms are negative.

Diagnosis: Acute intestinal infection of unknown etiology, severe course. Dehydration of I grade. Allergic reaction. Hypotrophy of I- II grade.

Treatment: sorbents Pulv. Smectae 0,001 x q.i.d. 3, oral rehydration therapy, infusion therapy with glucose and salt solutions, Tab. Furazolidone 0.015 x q.i.d. 4. Diet: breast feeding on demand with control baby weighing.

On June 9, 2015 due to the intensive abdominal pain (the baby flexed his legs and cried during abdomen palpation) the patient was referred to surgical department of Regional government-owned publicly funded health care institution "Regional Children's Hospital No. 1". No surgical pathology was revealed.

Complete blood count (10 June 2015): RBC– $4.3 \times 10^{12}/L$, Hb – 117 g/L, PLT– $152 \times 10^9/L$, Blood sedimentation rate– 5 mm/hour; WBC – $16.1 \times 10^9/L$, bands – 1%, segmented – 22%, LYMPH– 66%, MON – 3%, EOS - 8%.

Metabolic Panel (10 June 2015): Na – 130.8 $\mu\text{mol}/L$; K – 6.8 $\mu\text{mol}/L$; Glucose – 2.2 mmol/L; Total bilirubin – 32.4 $\mu\text{mol}/L$; ALT– 5.2 U/L;AST – 38.8 U/L.

On June 10, 2015, parts of a helminth were excreted into the diaper in the form of a grey twisted rope. Total length of helminth body was about 70 cm. Results of laboratory examination: separate units of unidentified helminth on the back of a great number of epithelial cells.

Given the infant's age (1 month old), feeding characteristics (entirely breast milk); medical history data (acute onset of the disease with dyspeptic disorders, allergy, intestinal symptoms), body weight loss (220 g loss during the first month of life) despite breast feeding on demand and sufficient amount of mother's milk (according control weighing baby ate about 120 g during every meal), as well as laboratory examination results (high blood EOS count – up to 8%, and the total length of helminth body about 70 cm in the form of narrow grey band 1-2 mm in diameter) an impression was made of cestodiasis invasion, specifically beef tapeworm infection (taeniarhynchosis) with juvenile immature helminth.

The situation seemed to be as follows. Infant's mother was likely to suffer from chronic taeniarhynchosis. It was supported by indirect helminthiasis symptoms revealed during thorough history analysis, such as frequent intake of rare steaks before

and during pregnancy, distended abdomen, periorbital cyanosis with black eye-rim formation, symptoms of asthenia. Segments of beef tapeworm (*Taeniarhynchus saginatus*) are commonly excreted with patient's faeces, but in contrast to the other helminths, some of these segments are able to excrete independently through anus on their own and move around it. So, in our case segments are likely to have moved into genital tract of the pregnant woman, and a baby while passing through the genital tract during delivery have swallowed them. In a month period helminth passed stages of embryo, larva, and mease and developed a final stage of taeniarhynchosis – stage of a tapeworm.

No cases of human contamination omitting mease stage have yet been reported. We have not found any published source describing tapeworm invasion in infants up to present moment. However there was published a case of unusual and irrational location of a tapeworm in the anterior eye chamber [5]. So there was decided to treat a child with a single dose of Tab. Praziquanteli 10 mg/kg (40 mg).

On treatment patient showed improvement: pain, dyspepsia, and intestinal syndrom reversed, allergy symptoms disappeared. Diaper rash is in regeneration stage. The patient was discharged on June 17, 2015. Body weight gain was 450 g during 7 days after antihelminthic agent administration. Recommendations were given on further helminthiases testing with enzyme immunoassay. Mother was referred to infectious disease physician for examination and treatment.

3. Resume

Presented case gives strong evidence of the following:

1. Modes of acquisition in children are diverse and need to be revised.
2. Parasitic invasions in children simulate severe somatic (allergy) or infectious (intestinal infection) diseases.

4. Conclusion

Parasitic invasions are quite common in pediatric population and may occur even in infants. Helminthiases are showed allergic rash on the face and body there is maculopapular.

Disclosure

The authors have no conflicts of interest to disclose.

Acknowledgements

We would like to thank the nursing staff of Infectious department of Vladivostok Clinical Hospital No. 2 for their support and patience, without which this project would have been impossible.

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Endothelial dysfunction in children born to tobacco smoking mothers

Abstract: 127 children at the age from birth to three years were under observation. The control group included 32 healthy children born to non-smoking mothers. The consequences of smoking during pregnancy were evaluated by the thiocyanate content in children's blood serum. We have revealed that all children have endothelial dysfunction that is determined by the decrease of content of vasodepressor of S-nitrosothiols and the increase of endothelium-1 vasoconstrictor, that is connected with the effects of tobacco smoke during gestation.

Keywords: smoke tobacco, children, thiocyanate.

The analysis of a great number of works devoted to the effect of smoking on the body of a healthy person convincingly proves that there is no a single organ or a system in the body that is not harmfully influenced by smoking [4,8]. The conducted experimental studies have shown that the effect of tobacco smoke on the body of the mother reduces the compensatory-adaptive mechanisms of the fetus, lowers its resistance to the influence of hypoxia and leads to the increase in perinatal morbidity and mortality [5,6,7].

Literature data analysis shows that the features of endothelial dysfunction in young children born to tobacco smoking mothers have not been studied enough.

Materials and Methods

We have observed 127 children at the age from birth to three years. Among them there were 70 (55.2%) boys and 57 (44.8%) girls. In the control group there were 32 healthy children who were born to non-smoking mothers.

In order to estimate the degree of possible passive tobacco smoking we have measured the content of cyanide metabolite – thiocyanate in the blood serum of children using spectrometric method [3]. To estimate the functional state of endothelium in the blood serum of children we have measured the content of endothelial factors: 1) endothelium-1 using immunoassay method and the set of reagents Endothelin (1-21) EIA kit produced by Diameb (Austria) according to the instructions for analysis, which allows to measure small amounts of substances 2) S-nitrosothiol (stable metabolite of nitric oxide) using spectrofluorimetric method [2]. Endothelium-1 is the most powerful in the family of endotheliums produced by endothelium – vasoconstrictor. Nitric oxide – endothelial factor of vascular relaxation (vaso-depressor). It is an extremely rapidly metabolizing compound, therefore its content in blood serum is estimated by the concentration of stable metabolites - nitrosothiols. The functional state of endothelium is estimated by ratio of endothelium-1 and S-nitrosothiols. The disbalance in the content of these compounds is considered as endothelial dysfunction.

We have determined the consequences of maternal tobacco smoking during pregnancy, which were evaluated by the content of thiocyanate in the blood serum of children. The groups were formed according to the content of thiocyanate in the blood serum of the examined children. In Group I (49 children) there has been registered a high content of thiocyanate ($8,64 \pm 0,52$ mg/l); in Group II (46 children) there has been an increased content of thiocyanate ($3,64 \pm 0,52$ mg/l); in Group III, the control one (32 children) there has been registered a normal content of thiocyanate ($1,03 \pm 0,07$ mg/l) [3].

Our research has shown that the children from Group I and Group II have endothelial dysfunction, the degree of which rises with an increase of the content of thiocyanate, i.e. with an increase of passive smoking degree that might be related to the effects of tobacco smoke during gestation.

fn. P - the reliability of the difference score of children in Group I and Group II relative to that of Group III; P1 - the reliability of the difference score of children in Group I relative to that of Group II.

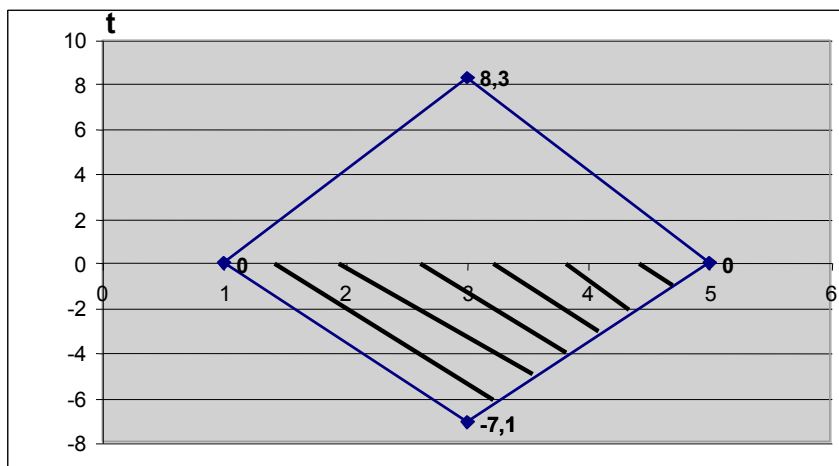
The data from Table 1 shows that in children with the increased content of thiocyanate there has been observed a significant increase (for 187%; $P < 0,001$) of the level of vasoconstrictor endothelium-1. The most significant increase of endothelium-1 content in comparison with the control group has been registered in the group of

Table 1


Content of endothelium-1 and S-nitrosothiols in the blood serum of the examined children, (M±m)


Groups of Children	endothelium-1, fmol/ml	S-nitrosothiols, mmol/ml.	thiocyanate, mg/l
Control Group	0,45±0,02	0,53±0,02	1,03±0,07
with an increased content of thiocyanate	1,29±0,11 P<0,001	0,35±0,02 P<0,02	3,75±0,21 P<0,001
with a high content of thiocyanate	2,37±0,16 P<0,001 P ₁ <0,001	0,18±0,01 P<0,001 P ₁ <0,001	8,64±0,52 P<0,001 P ₁ <0,001

children with a high level of thiocyanate (for 426%; P<0,001). In addition, there have been detected the definite differences in the level of endothelium-1 in children with high and increased content of thiocyanate (P<0,001). In the group of children with an increased content of thiocyanate there has been registered a 34% decrease of S-nitrosothiols (P<0,002), and in the group with a high content of thiocyanate we have registered the maximum decrease of S-nitrosothiols that made 67% (P<0,001). Besides, there have been detected the definite differences in the concentration of S-nitrosothiols in the group of children with high and increased content of thiocyanate (P<0,001).



Picture 1. Complex estimation of the deviation degree of endothelium-1 and S-nitrosothiols on the whole in children with passive smoking

fn.  the degree of a decrease of vasodepressor;

 the degree of an increase of vasoconstrictor.

The degree of endothelial dysfunction on the whole in children with passive smoking is indicated by the expressed manifestations of endothelial dysfunction that is the domination of the degree of a decrease of vasodepressor ($t=8,3$; $P<0,001$) over the degree of an increase of vasoconstrictor ($t=7,1$; $P<0,001$). Hence, the children with passive smoking have the deficit of endothelial function compensation.

Conclusions

We have revealed that all children have endothelial dysfunction that is determined by the decrease of content of vasodepressor of S-nitrosothiols and the increase of endothelium-1 vasoconstrictor, that is connected with the effects of tobacco smoke during gestation.

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Idiotypic and antiidiotypic neural autoantibodies in opium addiction comorbide with HIV infection

Abstract: Over the last few years drug addiction rate have been consistently elevated despite the efforts focused to prevent expansion of narcotic substance use. Opium drug is taken intravenously, what contributes to prevalence of HIV infection among intravenous drug users. Meanwhile, neurochemical and molecular correlations of drug effects are still understudied; there are no simple, objective, easily reproducible tests for patient's condition assessment at different stages of opium addiction (OA) disease.

Goal of the research: assessment of change of idiotypic (aAB1) and antiidiotypic (aAB2) autoantibodies to S100 neural proteins, MBP, Glial Fibrillary Acidic Protein, Nerve Growth Factor in different conditions of opium addiction: intoxication, abstinence syndrome and post-withdrawal remission comorbide with HIV infection. Determination of prognosis criteria of the effect thereof.

Patients and methods: 169 people were examined. 70 patients had OA without HIV infection, 63 patients had OA comorbide with HIV infection, 18 people were healthy (control group 1) and 18 people were affected by HIV infection without drug addiction (control group 2). In order to determine level of serum neurotropic autoantibodies (auto-AB) of IgG class to S100 neural proteins, Glial Fibrillary Acidic Protein, MBP, Nerve Growth Factor "IFA-NEYRO-AT" method was used (Biofarm-test Co., Ltd.). It resulted that statistical confidence of differences in neural antibody level in blood serum of control groups was not proved. At the same time their counterbalance (antiidiotypic antibodies) showed statistically significant difference: serum aAB2 level to S100 proteins, Glial Fibrillary Acidic Protein, MBP ($p \leq 0,05$) of control group 2 was reduced

against healthy controls. Consequently, aAB1 and, especially aAB2 level to S100 neural proteins, Glial Fibrillary Acidic Protein, MBP in HIV+ drug dependants is statistically significantly lower than in those affected only by HIV infection and, of course, in healthy people ($p \leq 0,05$). Only antiidiotypic antibodies to Nerve Growth Factor protein are released – being accumulated, their level exceeds control values ($p \leq 0,05$).

AutoAB2 to the same protein are trigger in different conditions of opium addiction comorbide with HIV infection ($p \leq 0,05$).

Thus, aAB1 and aAB2 to S100 proteins, Glial Fibrillary Acidic Protein, MBP, Nerve Growth Factor are predictors when determining people with opium addiction comorbide with HIV infection having significantly decreased values compared to healthy persons and drug addicts. AutoAB2 to Nerve Growth Factor protein is differentiation in different conditions of opium addiction comorbide with HIV infection: their level is the highest in the condition of intoxication and it is the lowest in the condition of abstinence syndrome

Keywords: Autoantibodies, S100 neural proteins, MBP, Glial Fibrillary Acidic Protein, Nerve Growth Factor; opium addiction; idiotypic, antiidiotypic autoantibodies; immune response, abstinence syndrome; opium intoxication; heroine; remission.

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Роль идиотипических и антиидиотипических нейроаутоантител при опишной наркомании, сочетанной с ВИЧ-инфекцией

Аннотация: Уровень наркомании в течение последних лет остается стабильно высоким, несмотря на усилия, направленные на предотвращение распространения употребления наркотических веществ. Опиный наркотик принимается внутривенно, что способствует широкому распространению ВИЧ-инфекции

в среде внутривенных наркоманов. При этом остаются недостаточно изученными нейрохимические и молекулярные корреляции действия наркотических средств, нет простых, объективных, легко воспроизводимых тестов для оценки состояния пациента при различных стадиях заболевания опийной наркоманией (ОН).

Цель исследования: оценка динамики идиотипических (аАТ1) и антиидиотипических (аАТ2) аутоантител к нейробелкам S100, ОБМ, ГФКП, ФРН при различных состояниях опийной наркоманией, коморбидной с ВИЧ-инфекцией: интоксикации, абстиненции и постабстинентной ремиссии. Определить прогностические критерии их влияния.

Пациенты и методы: обследовано 169 человек. С ОН без ВИЧ-инфекции – 70 пациентов, с ОН сочетанной с ВИЧ-инфекцией – 63, здоровых лиц – 18 (контрольная группа 1), больных ВИЧ-инфекцией без наркоманией – 18 человек (контрольная группа 2). Для определения уровней содержания сывороточных нейротропных аутоантител (а-АТ) класса IgG к нейробелкам S100, ГФКП, ОБМ, ФРН использован метод «ИФА-НЕЙРО-АТ» (ООО «Биофарм-тест», Оказалось, что статистическая достоверность различий уровня нейротропных аутоантител (аАТ1) в сыворотке крови контрольных групп не подтверждена. При этом у их противовесов (антиидиотипических антител) разница оказалась статистически значимой: снижен уровень сывороточных аАТ2 к белкам S100, ГФКП, ОБМ ($p \leq 0,05$) контрольной группы 2 по отношению к контролю здоровых лиц. Соответственно, уровень аАТ1 и, особенно аАТ2, к нейробелкам S100, ГФКП, ОБМ у наркозависимых с ВИЧ-инфекцией статистически значимо ниже, чем у больных только ВИЧ-инфекцией, и, конечно же, здоровых лиц ($p \leq 0,05$). Содержание же в сыворотке антиидиотипических антител к белку ФРН, накапливаясь, превышает контрольные величины ($p \leq 0,05$).

АутоАТ2 к этому же белку являются триггерными при различных состояниях опийной наркоманией, сочетанной с ВИЧ-инфекцией ($p \leq 0,05$).

Таким образом, аАТ1 и аАТ2 к белкам S100, ГФКП, ОБМ, ФРН являются предикторами при выявлении лиц с опийной наркоманией, коморбидной с ВИЧ-инфекцией, имея значимо сниженные значения в сравнении со здоровыми лицами и наркозависимыми. АутоАТ2 к белку ФРН являются дифференцировочными при различных состояниях опийной наркоманией, сочетанной с ВИЧ-инфекцией: наименьший их уровень достигает в состоянии абстиненции, наибольший – в интоксикации.

Ключевые слова: Аутоантитела, нейробелки S100, ОБМ, ГФКП, ФРН; опийная наркомания; идиотипические, антиидиотипические аутоантитела; абстинентный синдром; интоксикация опиумом; ремиссия.

Введение

Опийная наркомания – хроническое заболевание, при котором большую роль в патогенезе заболевания играют опиатные рецепторы, дофамин-серотонинэргическая система при значительной роли иммунологических механизмов. Хроническое внутривенное введение опия оказывает свое повреждающее влияние на все органы и системы в том числе и на иммунокомпетентные клетки. Опиный наркотик формирует вторичную иммунную недостаточность [1, 2, 3, 4, 5, 6].

Воздействие на головной мозг влечет за собой развитие нейровоспаления, нейродегенерации проявляющиеся аксональной и синаптической дисфункцией, нарушением метаболизма, развитием апоптоза [8]. Иммунологических маркеров или индикаторов, указывающих на определенное состояние наркомании, не выявлено. Поиск маркеров, указывающих на наличие признаков наркологического заболевания, его стадии, активности, факта употребления наркотического вещества ведется на уровне генетических и иммунологических факторов в развитии болезней зависимости от психоактивных веществ [7].

ВИЧ-инфекция, поражая организм, влечет за собой различные формы поражения центральной и периферической нервной системы, вплоть до развития ВИЧ-энцефалопатии, СПИД-деменции, что также проявляет себя в изменениях показателей иммунной системы [9,10,11].

Изучение динамики нейроаутоантител предполагает найти их взаимосвязь с клинической картиной опийной наркомании, в том числе и сочетанной с ВИЧ-инфекцией. Наиболее часто биомаркерами повреждения мозга считают S100, ГФКП, ОБМ, ФРН. Кальций связывающий белок S100 – играет главную роль в процессах развития и прогрессирования атеросклероза и сосудистого воспаления. Глиальный фибриллярный кислый белок (GFAP) вырабатывается астроцитами и эпендимальными клетками. Его концентрация значительно увеличивается в сыворотке крови пациентов в результате некротического разрушения клеток головного мозга. ОБМ (основной белок миелина) участвует в организации сборки и поддержании структурной целостности миелина в центральной и пери-

ферической нервной системе. ФРН (фактор роста нервов) – нейротрофин, участвующий в регуляции развития холинергических нейронов, в установлении контактов между нейронами ЦНС и ее периферии. Нейропептидные комплексы составляют основу эмоционально-мотивационного поведения человека, участвуют в регуляции таких процессов, как голод, жажда, боль, сон, память, внимание, работоспособность. Участвуют в регенеративных процессах нервной ткани [12,13].

Поражение ЦНС у больных ВИЧ, развивается преимущественно на фоне гиперактивации или супрессии аутоантителогенеза и значительно реже – у больных с нормальным уровнем нейротропных аАТ. Изменение профиля иммунореактивности сывороточных нейроаутоантител отражает избыточное поступление антигенов в межклеточные пространства при патологической активации их продукции или избыточной гибели клеток, их продуцирующих. Аномалии уровней аАТ предполагает нарушения водно-электролитного баланса и энергетического метаболизма нейронов, нарушения функции нервно-мышечных контактов и нейрон-нейронных взаимодействий, демонстрирует связь выявленных нарушений в нервной системе с неспецифической иммунной активацией, связанной с системными воспалительными процессами [14].

ЦНС изолирована от системы кровообращения и общей иммунной системы организма достаточно мощным гемато-энцефалическим барьером и в нормальных условиях недоступна для эффекторных, иммуноактивных клеток – лимфоцитов и макрофагов общей иммунной системы организма. Нейроэндокринная и иммунная регулирующие системы мозга организованы в сложные сети, задача которых обеспечение контрольно-защитных функций мозговой деятельности. В этой связи они представляют собой в отличие от гематоэнцефалического барьера (ГЭБ) специфический подвижный иммунологический барьер мозга [13]. Таким образом, любые изменения в мозговой ткани будут проявляться в изменениях иммунных и аутоиммунных показателях, в том числе и в уровне аутоантел к нейробелкам.

Целью исследования являлась оценка динамики идиотипических (аАТ1) и антиидиотипических (аАТ2) сывороточных аутоантител к нейробелкам S100, ОБМ, ГФКП, ФРН при различных состояниях опийной наркомании: интоксикации, абстиненции и постабстинентной ремиссии, коморбидной с ВИЧ-инфекцией. Определить прогностические критерии их влияния.

Материал и методы

Обследовано 169 человек (все мужчины) с диагнозом опийная наркомания (стаж не менее 5 лет), сочетанная и без ВИЧ-инфекции. Возраст от 22 до 38 лет ($29,5 \pm 3,7$). Выделено 4 группы:

– больные опийной наркоманией, находящиеся в разных состояниях без сопутствующего диагноза ВИЧ-инфекция. Обследовано 70 больных со сформированной опийной наркоманией. Выделено три подгруппы (интоксикация, абстиненция, ремиссия),

- больные опийной наркоманией, находящиеся в разных состояниях опийной зависимости, сочетанной с ВИЧ-инфекцией (В20 - 4 стадия) – 63. Выделено три подгруппы (интоксикация, абстиненция, ремиссия),

- контрольная группа 1 (здоровые лица) – 18 человек, не страдающих заболеваниями,

- контрольная группа 2 - 18 больных с диагнозом ВИЧ-инфекция, без наркомании. Путь инфицирования - половой.

Обследование включало определение уровня идиотипических и антиидиотипических антител класса Ig G к белкам нервной ткани S100, ОБМ, ГФКП, ФРН в сыворотке крови методом ИФА производства ООО «Биофарм-тест» РФ, разрешено к применению на территории РФ. Для изучения взаимосвязей между исследуемыми параметрами проводился анализ в программе Statistica 6.0.

Результаты исследования

Проведенный анализ спектра аутоантител при опийной наркомании без ВИЧ и опийной наркоманией, коморбидной с ВИЧ-инфекцией выявил статистически достоверное снижение уровня аАТ1 и аАТ2 при ОН с ВИЧ-инфекцией.

Сравнительный анализ спектра аутоантител при опийной наркомании, коморбидной с ВИЧ-инфекцией, со здоровыми лицами выявил статистически достоверные изменения в синтезе всех исследуемых аутоантител 1-го и 2-го уровня, причем отмечено увеличение у аАТ2 ФРН (до $151,7 \pm 20,2$ усл.ед., против $127,4 \pm 20,3$ усл.ед., $p \leq 0,05$), к другим белкам - снижение ($p \leq 0,05$). Причем наиболее выраженное - у аАТ2 к S100 и ОБМ.

Анализ этой же группы с контрольной группой 2 (ВИЧ-инфекция без наркомании) не показал значительных изменений в синтезе исследуемых аутоантител ($p > 0,05$).

В состоянии интоксикации по отношению со здоровыми лицами отмечено увеличение аАТ2 к ФРН ($155,9 \pm 25,1$ усл.ед. против $127,4 \pm 20,3$ усл.ед., $p \leq 0,05$), остальные аАТ1 и аАТ2 были снижены, наиболее активно S100 ($155,1 \pm 34,8$ усл.ед., против $217,2 \pm 22,1$ усл.ед., $p \leq 0,05$) и ОБМ ($147,7 \pm 31,1$ усл.ед. против $197 \pm 17,2$ усл.ед., $p \leq 0,05$) (табл. 1).

В состоянии абстиненции выявлено статистически достоверные изменения содержания практически всех исследуемых аутоантител (АТ1 S100 - $p > 0,05$). Наиболее выраженные - снижение АТ2 к S100 ($162,1 \pm 36,1$ усл.ед., против $217,2 \pm 22,1$ усл.ед., $p \leq 0,05$).

В ремиссии также зафиксированы статистически достоверные изменения в содержании исследуемых аутоантител, исключая АТ1 к S100 ($p > 0,05$). Наиболее значимые изменения - АТ2 к S100 и ОБМ (снижено в 1,4 раза, $p \leq 0,05$).

У лиц с ВИЧ-инфекцией при смене состояний опийной наркомании обнаружено, что при переходе от интоксикации к абстиненции достоверно увеличено только АТ2 к ОБМ и ФРН ($p \leq 0,05$). При наступлении состояния ремиссии, выявлено достоверное снижение АТ1 к ГФКП ($p \leq 0,05$), АТ2 к ГФКП и ОБМ ($p \leq 0,05$). При сравнительной характеристике уровня аутоантител при интоксикации опиумом и ремиссии статистически достоверных изменений не выявлено ($p > 0,05$).

Таблица 1.

Уровень идиотипических и антиидиотипических аутоантител к нейробелкам при различных состояниях опийной наркомании, сочетанной с ВИЧ-инфекцией

Показатели	Состояния опийной наркомании			Контрольная группа 1 (здоровые лица) n = 18	Контрольная группа 2 (с ВИЧ+ без ОН) n = 18	Достоверность различий p
	Интоксикация n = 21	Абстиненция n = 22	Ремиссия n = 20			
№ п/п	1	2	3	4	5	
Уровень аАТ1 (усл.ед.):						
к белку S100	$184 \pm 34,7^*$	$178,8 \pm 28,1$	$177,2 \pm 31$	$203,8 \pm 29,9$	$179,9 \pm 54,6$	$p_{1,2,3} > 0,05$
к белку ГФКП	$121,4 \pm 15,9^*$	$119,7 \pm 9,6^*$	$114,6 \pm 6^*$	$136,2 \pm 13,1$	$135,3 \pm 56,7$	$p_3 \leq 0,05$

к белку ОБМ	118,2±10,1*	123,4±5,7*	121,5±10,6*	138,5±13,4	142±54,3	$p_{1,2,3}>0,05$
к белку ФРН	139,2±18,9*	134,3±9,9*	128,9±13,7*	145,3±10,8	133±39,6	$p_{1,2,3}>0,05$
Уровень аАТ2 (усл.ед.):						
к белку S100	155,1±34,8*	162,1±36,1*	156,7±30,7*	217,2±22,1	173,7±64	$p_{1,2,3}>0,05$
к белку ГФКП	131,2±22,2*	136±14,8*	124,7±9,9*	153,3±7,9	124,8±29,8	$p_3\leq 0,05$
к белку ОБМ	147,7±31,1*	162,6±19,1*	144,4±20,7*	197±17,2	133,7±57,1	$p_{1,2}\leq 0,05$
к белку ФРН	155,9±25,1*	146,9±13,2*	150±17,2*	127,4±20,3	153,5±70,2	$p_{1,2,3}>0,05$

Примечание: статистическая достоверность различий показателей с группой контроля 1 $p\leq 0,05$ - *, с группой контроля 2 $p\leq 0,05$ - **, между подгруппами 1 и 2 – p_1 , 1 и 3 – p_2 , 2 и 3 – p_3

Проведенный анализ показателей уровня аутоантител в подгруппах лиц, страдающих опийной наркоманией сочетанной с ВИЧ-инфекцией (в состоянии интоксикации, абстиненции и ремиссии), и контрольной группой 2 (ВИЧ-инфекция без наркомании) не выявил статистически достоверных изменений ($p>0,05$).

Обсуждение результатов

Имеющиеся исследования в области молекулярной иммунологии подчеркивают, что изменения в динамике аутоантител к нейробелкам S100, ГФКП, ОБМ, ФРН свидетельствуют о повреждении нейронов головного мозга, об изменениях, которые претерпевает нервно-мозговая ткань. Данные повреждения влекут за собой формирование психических расстройств, снижение психической активности и общего качества жизни психической деятельности [15].

Формирование опийной наркомании – сложный патогенетический процесс, отражающий реакции организма на введение наркотических веществ и эти реакции меняются и зависят от длительности употребления наркотика, различных состояний проявления опийной наркомании. Дисфункция регуляторного звена иммунной системы усугубляет течение заболевания, вызывая его прогрессирование. Уровень аутоантител к мозговым нейробелкам отражает активность иммунных реакций на повреждение организма и его способность к адаптации на

хроническое введение опийного наркотика. Результаты исследования позволяют предположить, что повреждения мозговой ткани организм пытается компенсировать, включая механизмы иммунной защиты, поэтому они выявляются на уровне антиидиотипических аутоантител. При присоединении к наркомании ВИЧ-инфекции организм уже не справляется с патогенным воздействием нескольких факторов (токсического и инфекционного характера), что приводит к более значительным повреждениям мозга и проявляется большей и достоверной степенью различий повреждений ЦНС.

Согласно результатам исследования различных состояний опийной наркомании, сочетанной с ВИЧ-инфекцией, идиотипические аутоантитела показывают общую разбалансировку иммунных реакций, показатели же содержания аутоантител 2-го уровня стабильно подчеркивают свою достоверность ($p \leq 0,05$), что позволяет предположить, что именно аутоиммунные процессы 2-го уровня начинают отражать более стабильные повреждения мозговой ткани и могут являться критериальными показателями изменений при опийной наркомании. Стадия опийной наркомании, сочетанной с ВИЧ-инфекцией, проявляющая наибольшую активность в динамике своих показателей – состояние абстиненции, при которой наиболее выражена клиническая картина. Поражения нервной системы в результате действия опийного наркотика и сочетанного влияния ВИЧ-инфекции на организм привело к тому, что сравнительная характеристика с контрольной группой здоровых лиц практически при всех состояниях показала свою статистическую достоверность, что позволяет предполагать, достаточно грубые изменения в организме при коморбидной патологии, влекущие за собой достоверные изменения. Таким образом, уровень идиотипических (исключая аАТ1 S100) и антиидиотипических аутоантител к нейробелкам S100, ГФКП, ОБМ, ФРН может являться прогностическим маркером состояния интоксикации, абстиненции состояния ремиссии у пациентов с опийной наркоманией, сочетанной без ВИЧ-инфекцией.

Заключение

Особенности динамики аутоантител к нейробелкам необходимо принимать во внимание при оценке клинического состояния опийной наркомании, сочетанной с ВИЧ-инфекцией. Изменение синтеза аутоантител может являться патогенетическим звеном нарушений нервной системы при опийной наркомании в сочетании с ВИЧ-инфекцией. Наиболее выраженные изменения уровня аутоантител к мозговым нейробелкам выявлены при абстинентном синдроме опийной

наркомании, при котором клиническая картина более выражена, и она вовлекает в свои процессы дезадаптации, в том числе и мозговые аутоантитела. Уровень аутоантител к нейробелкам S100, ГФКП, ОБМ, ФРН при опийной наркомании в сочетании с ВИЧ-инфекцией возможно учитывать в качестве маркеров клинических состояний. Сочетание наркомании и ВИЧ-инфекции приводит к более значительным повреждениям мозга и проявляется большей и достоверной степенью различий повреждения ЦНС на уровне нейроаутоантител.

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Biophysical indicators of buccal epithelium cells upon exudative erythema multiforme

Introduction. Exudative erythema multiforme of the oral cavity mucosa is an acute inflammatory disease, a common concept of its systemic therapy is vacant, which is indicating a need for further research in this area.

Purpose of the study. Assessment of the charge state of buccal epithelial cells in patients with erythema during complex differentiated prevention and treatment.

Materials and methods. Patients groups of comparison received only the basic therapy, and basic groups, depending on the immune reactivity additionally received differentiated preventive complex which is include interferon, solkoseril, prednisolone, and also elixirs lizomukoid and kvertulin.

Results. Conclusions. In exudative erythema multiforme differentiated application of treatment and preventive complex with the use of anti viral, immune regulatory and desensitizing, also anti inflammatory and drugs restoring the work of the blood vessels, improves the phospholipid layer of buccal cell membranes and their charge, normalizes impaired cell metabolism and as a consequence, increases the nonspecific resistance in the organism, and in particular in the oral cavity.

Keywords: exudative erythema multiforme, therapeutic and preventive complex, buccal epithelium cells, the charge state.

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Биофизические показатели клеток буккального эпителия при многоформной экссудативной эритеме

Аннотация: Приведены результаты оценки зарядового состояния клеток буккального эпителия у пациентов различного возраста с многоформной экссудативной эритемой с различной иммунологической реактивностью организма. Показано, что дифференцированное применение лечебно-профилактических комплексов с использованием, как противовирусных, иммуно-регуляторных, так и десенсибилизирующих, противовоспалительных и восстанавливающих работу кровеносных сосудов препаратов улучшает при этом состояние фосфолипидного слоя мембран клеток и их заряд, нормализует нарушенный клеточный метаболизм и, как следствие, повышает неспецифическую резистентность в организме, и в полости рта в частности у пациентов с эритемой.

Ключевые слова: многоформная экссудативная эритема, лечебно-профилактический комплекс, клетки буккального эпителия, зарядовое состояние.

Многоформная экссудативная эритема (МЭЭ) слизистой оболочки полости рта представляет собой островоспалительное заболевание, характеризующееся высыпаниями, склонное к рецидивам. В основе этой патологии лежат генетические особенности пациента, воздействие факторов внешней среды, воспалительные и инфекционно-аллергические реакции, дисбиотические нарушения в организме [1, 2].

Несмотря на интенсивный поиск эффективных способов лечения МЭЭ, единая концепция в системной терапии МЭЭ отсутствует. В отдельных работах

проведена оценка клинико-иммунологической эффективности различных препаратов, обладающих противовирусной и иммунорегуляторной активностью, стимулирующих транскрипцию генов TLR- и RLR-рецепторов и факторов сигнальной трансдукции в клетках крови человека, повышающих эффективность лечения [3, 4, 5, 6].

Существующая в научной литературе информация свидетельствует о необходимости дальнейших исследований вопросов дифференцированной профилактики и лечения патологии МЭЭ в полости рта, а также поиска эффективной экспресс-оценки результатов применения лечебно-профилактических мероприятий при этой сложной патологии.

Цель исследования – оценка зарядового состояния клеток буккального эпителия (КБЭ) пациентов с МЭЭ на различных этапах проведения её комплексного лечения и профилактики осложнений при сниженных и повышенных иммунных реакциях в организме.

Материалы и методы. Было обследовано 58 пациентов в возрасте 20-60 лет с диагнозом МЭЭ, в том числе и с герпес-ассоциированной формой (ГАМЭЭ), из которых были составлены 4 группы пациентов со сниженными иммунными реакциями - 15 человек возраста 20-40 лет (группа сравнения - 7 чел., основная группа - 8 чел.) и 16 человек возраста 40-60 лет (группа сравнения - 8 чел., основная группа - 8 чел.), а также 4 группы пациентов с повышенной иммунной реактивностью - 13 человек возраста 20-40 лет (группа сравнения - 6 чел., основная группа - 7 чел.) и 14 человек возраста 40-60 лет (группа сравнения - 7 чел., основная группа - 7 чел.). Пациенты группы сравнения получали только базовую терапию, включавшую в себя энтеросорбенты (энтеросгель), антигистаминные препараты (лоратадин), десенсибилизирующие препараты (глюконат кальция), капилляропротекторы (аскорутин) и местно обезболивающие, антисептические и протеолитические препараты. При выраженных явлениях интоксикации (средней степени тяжести заболевания) назначали дополнительно реосорбилакт 200 мл в/в № 3, и тиосульфат натрия 30% - 10 мл в/в № 3.

Пациенты основных групп со сниженной иммунной реакцией дополнительно к базовой терапии получали профилактический комплекс, включавший интерферон и солкосерил по схеме в виде инъекций в течении 10 дней, а пациенты с повышенной иммунной реактивностью дополнительно к базовой терапии

получали комплекс, включавший преднизолон (30 мг в сутки 1,5 месяца, каждую неделю уменьшая на 5 мг) исолкосерил, а также эликсир «Лизомукоид» имукозальный гель «Квертулин». Все исследования проводили с соблюдением требований биоэтики. Препараты готовились по методике Шахбазова В. Г. [7]. Процент подвижных ядер и плазмолемм КБЭ в электрическом поле напряженностью 28 В/см оценивался с помощью биологического микроскопа при увеличении 480х для 100 неповрежденных клеток в каждом препарате. Амплитуды смещения ядер и плазмолемм оценивались с помощью окулярной линейки микроскопа.

Результаты и их обсуждение. Известно, что неферментативное свободно-радикальное окисление (СРО) липидов клеточных мембран играет существенную роль в патогенезе пародонтита и в норме ограничивается физиологической антиоксидантной системой (ФАС) [8]. При срыве антиоксидантной защиты и развитии СРО начинается повреждение плазматических мембран вследствие пероксидации фосфолипидов. При этом изменяется диффузионный двойной электрический слой, возникающий на поверхности плазмолемм и их дзета-потенциал.

В работе [9] предложена гипотетическая модель распределения зарядов в живой растительной клетке и сделан вывод о значительной роли в процессах биогенеза электрически отрицательно заряженных клеточных ядер. В работе [7] показано, что электрофоретическое смещение электроотрицательных ядер КБЭ внутри цитоплазмы, при помещении клетки во внешнее электрическое поле, связано с функциональным состоянием клетки и организма в целом и зависит от возраста человека.

В работе [10] показано, что зарядовое состояние ядер и плазмолемм клеток буккального эпителия связано с уровнем неспецифической резистентности в полости рта и зависит от степени воспалительного процесса в тканях пародонта и интенсивности кариозного процесса. В случае нормального уровня неспецифической резистентности и, соответственно, нормального уровня адаптационно-компенсаторных реакций в организме, клеточный метаболизм включает в себя процесс выхода из ядра в цитоплазму молекул РНК и при необходимости ДНК, в результате чего ядро клетки приобретает отрицательный электрический заряд и может смещаться во внешнем электрическом поле. При этом в норме начинает возрастать положительный заряд плазмолемм клеток, в результате чего они во внешнем электрическом поле смещаются противоположно смещению ядра

клетки. Причем, чем выше уровень неспецифической резистентности организма, тем быстрее эта реакция реализуется. При нарушенных функциональных реакциях в организме этот процесс в клетках заторможен. В предложенном методе кроме оценки процента электрофоретически подвижных ядер КБЭ оцениваются амплитуды электрофоретического смещения ядер и плазмолемм клеток и их отношение, что позволяет судить об уровне адаптационных и функциональных реакций в полости рта и переходных процессах в результате проводимых профилактики и лечения.

В таблицах 1-4 приведены результаты комплексной оценки зарядового состояния КБЭ пациентов с МЭЭ.

Таблица 1

**Электрофоретическая подвижность ядер и плазмолемм клеток
буккального эпителия при многоформной экссудативной эритеме
при использовании лечебно-профилактического комплекса
интерферон+солкосерил (20-40 лет)**

Сроки наблюдения	Показатели	Группа сравнения n = 7	Основная группа n = 8	Среднестатистическая норма при напряженности поля 28 В/см
До лечения	Подвижность ядер, %	27	29	50-75
	Амплитуда смещения ядер Ая, мкм	0,87±0,10	0,93±0,10 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,01±0,10	1,1±0,10 p> 0,1	2,7-3,6
	Апл/Ая	1,16	1,15	1,8-2,0
После лечения	Подвижность ядер, %	31	45	50-75
	Амплитуда смещения ядер Ая, мкм	1,1±0,10	1,2±0,10 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,38±0,20	1,93±0,20 p< 0,005	2,7-3,6
	Апл/Ая	1,25	1,58	1,8-2,0
Через 1 месяц	Подвижность ядер, %	28	42	50-75
	Амплитуда смещения ядер Ая, мкм	1,08±0,10	1,25±0,10 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,30±0,15	1,95±0,20 p< 0,03	2,7-3,6
	Апл/Ая	1,20	1,56	1,8-2,0

Примечание: p – показатель достоверности отличия от группы сравнения.

Таблица 2

**Электрофоретическая подвижность ядер и плазмолемм клеток
буккального эпителия при многоформной экссудативной эритеме
при использовании лечебно-профилактического комплекса
интерферон+солкосерил (40-60 лет)**

Сроки наблюдения	Показатели	Группа сравнения n = 8	Основная группа n = 8	Среднестатистическая норма при напряженности поля 28 В/см
До лечения	Подвижность ядер, %	33	31	30-50
	Амплитуда смещения ядер Ая, мкм	0,71±0,10	0,79±0,10 p> 0,1	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	0,88±0,10	0,95±0,10 p> 0,1	2,6-3,1
	Апл/Ая	1,25	1,21	1,8-1,9
После лечения	Подвижность ядер, %	32	42	30-50
	Амплитуда смещения ядер Ая, мкм	1,03±0,10	1,33±0,10 p< 0,05	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	1,31±0,15	2,01±0,20 p< 0,01	2,6-3,1
	Апл/Ая	1,27	1,51	1,8-1,9
Через 1 месяц	Подвижность ядер, %	30	40	30-50
	Амплитуда смещения ядер Ая, мкм	0,91±0,10	1,30±0,10 p< 0,01	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	1,14±0,10	1,98±0,20 p< 0,005	2,6-3,1
	Апл/Ая	1,26	1,53	1,8-1,9

Примечание: p – показатель достоверности отличия от группы сравнения.

Приведенные данные свидетельствуют о том, что у пациентов с МЭЭ и со сниженными иммунными реакциями в исходном состоянии наблюдался значительно меньший по сравнению со среднестатистической нормой процент подвижных ядер клеток, сниженные по сравнению с нормой амплитуды электрофо-

ретического смещения ядер и плазмолемм, а так же их отношение, что свидетельствует о сниженной неспецифической резистентности в организме и в полости рта. Использование базовой терапии в группах сравнения (20-40 лет) к существенному улучшению зарядовых показателей КБЭ не привело (табл. 1). В тоже время после дополнительного проведения в основных группах этого возраста терапии с использованием интерферона и солкосерила амплитуда смещения плазмолемм увеличилась на 40%, а отношение амплитуд смещения плазмолемм и

Таблица 3

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интерферон+солкосерил (20-40 лет)**

Сроки наблюдения	Показатели	Группа сравнения n = 6	Основная группа n = 7	Среднестатистическая норма при напряженности поля 28 В/см
До лечения	Подвижность ядер, %	32	31	50-75
	Амплитуда смещения ядер Ая, мкм	1,20±0,10	1,15±0,10 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,30±0,10	1,28±0,10 p> 0,1	2,7-3,6
	Апл/Ая	1,08	1,11	1,8-2,0
После лечения	Подвижность ядер, %	34	40	50-75
	Амплитуда смещения ядер Ая, мкм	1,1±0,10	1,29±0,15 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,31±0,15	2,10±0,20 p< 0,005	2,7-3,6
	Апл/Ая	1,19	1,62	1,8-2,0
Через 1 месяц	Подвижность ядер, %	30	40	50-75
	Амплитуда смещения ядер Ая, мкм	1,15±0,10	1,25±0,10 p> 0,1	1,5-2,0
	Амплитуда смещения плазмолемм Апл, мкм	1,30±0,15	2,0±0,15 p< 0,01	2,7-3,6
	Апл/Ая	1,13	1,60	1,8-2,0

Примечание: p – показатель достоверности отличия от группы сравнения.

Таблица 4

**Электрофоретическая подвижность ядер и плазмолемм клеток
буккального эпителия при многоформной экссудативной эритеме
при использовании лечебно-профилактического комплекса
интерферон+солкосерил (40-60 лет)**

Сроки наблюдения	Показатели	Группа сравнения n = 7	Основная группа n = 7	Среднестатистическая норма при напряженности поля 28 В/см
До лечения	Подвижность ядер, %	32	35	30-50
	Амплитуда смещения ядер Ая, мкм	1,10±0,10	1,20±0,15 p> 0,1	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	1,32±0,15	1,41±0,15 p> 0,1	2,6-3,1
	Апл/Ая	1,20	1,18	1,8-1,9
После лечения	Подвижность ядер, %	30	43	30-50
	Амплитуда смещения ядер Ая, мкм	1,08±0,10	1,15±0,10 p> 0,1	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	1,20±0,15	1,88±0,20 p< 0,05	2,6-3,1
	Апл/Ая	1,11	1,63	1,8-1,9
Через 1 месяц	Подвижность ядер, %	31	41	30-50
	Амплитуда смещения ядер Ая, мкм	1,15±0,10	1,22±0,10 p> 0,1	1,4-1,8
	Амплитуда смещения плазмолемм Апл, мкм	1,43±0,15	1,95±0,20 p = 0,05	2,6-3,1
	Апл/Ая	1,25	1,59	1,8-1,9

Примечание: p – показатель достоверности отличия от группы сравнения.

ядер Апл/Ая увеличилось на 26% и оставалось на этом уровне и через месяц после лечения (табл. 1). Аналогичные результаты были полученных в группах пациентов со сниженными иммунными реакциями и в возрасте 40-60 лет (табл. 2).

В таблицах 3-4 приведены результаты оценки зарядового состояния КБЭ у пациентов с МЭЭ и повышенной иммунной реактивностью. Использование дополнительно к базовой терапии профилактического комплекса преднизолон+солкосерил привело к незначительному увеличению процента подвижных в

электрическом поле ядер КБЭ, амплитуд смещения ядер и на 63%, увеличило амплитуду смещения плазмолемм, что привело к увеличению отношения $A_{пл}/A_{я}$ в 1,47 раз в возрасте 20-40 лет и в 1,38 раз в возрасте 40-60 лет по сравнению с исходным состоянием, приближая их к значениям среднестатистической нормы (табл. 3-4).

Приведенные данные свидетельствуют о том, что препарат «Солкосерил» способствующий активации аэробных метаболических процессов при окислительном фосфорилировании, повышающий потребление кислорода и стимулирующий транспорт глюкозы в клетки, находящиеся в состоянии гипоксии и метаболического истощения, нормализует в клетках организма и буккального эпителия метаболизм, о чем свидетельствует нормализация их зарядового состояния.

Выводы. Полученные результаты оценки зарядового состояния КБЭ у пациентов с МЭЭ с различной иммунологической реактивностью свидетельствуют о том, что дифференцированное применение лечебно-профилактических комплексов с использованием как противовирусных, иммунорегуляторных, так и десенсибилизирующих, противовоспалительных и восстанавливающих функцию кровеносных сосудов препаратов улучшает при этом состояние фосфолипидного слоя мембран клеток и увеличивает их заряд, нормализует нарушенный клеточный метаболизм и, как следствие, повышает неспецифическую резистентность в организме и в полости рта в частности.

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Preventive maintenance of obstetrics-gynecologic complications from positions etiopatogenetic approaches

Abstract: Results of researches in bunch of women of reproductive age with deficiency of vitamins of bunch B which received in complex preventive maintenance and treatment gestational complications vitaminized therapy. Data of the relative characteristic of clinico-laboratory supervision with bunch of women which took over standard therapy is cited. Efficacy of application of the offered etiopatogenetic approaches for the purpose of preventive maintenance and complex therapy of the gestational complications it is proved.

Keywords: gestational complications, vitamins, prophylaxis.

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Профілактика акушерсько-гінекологічних ускладнень з позицій етіопатогенетичних підходів

Анотація: Представлені результати досліджень в групі жінок репродуктивного віку з дефіцитом вітамінів групи В, які отримували у комплексній профілактиці та лікуванні гестаційних ускладнень вітамінну терапію. Наведені дані порівняльної характеристики клініко-лабораторних спостережень з групою жінок, що приймали стандартну терапію. Обґрунтовано ефективність застосування запропонованого етіопатогенетичного підходу з метою профілактики і комплексної терапії гестаційних ускладнень.

Ключові слова: гестаційні ускладнення, вітаміни, профілактика.

Вступ. Вітаміни групи В входять до складу ферментів, коферментів, фолатного та циклу трикарбонових кислот (Кребса) [1]. У популяції жінок Одеського регіону встановлені дефіцити більшості вітамінів: аскорбінової кислоти – у 40-100% осіб, вітамінів групи В – у 20-100% жінок (з них, тіаміну, піридоксину – до 60%, вітаміну В12 – до 15% населення). У 70-80% жінок спостерігається сумісний дефіцит трьох і більше вітамінів, тобто – полігіповітамінні стани незалежно від віку, пори року, місця мешкання [2].

За цих станів в організмі жінки є лише мінімальна кількість вітамінів, що запобігає розвитку тяжких форм вітамінної недостатності, але вітамінів недостатньої для повноцінних життєво необхідних процесів обміну речовин і функціонування репродуктивної сфери. Вітаміни групи В приймають безпосередню участь у всіх процесах обміну речовин та є взаємозалежними за своєю дією [3]. Дефіцит вітамінів цієї групи є ключовим моментом у виникненні таких захворювань як порушення менструальної функції, лейоміома матки, анемія [4,5].

Серед різноманітних безпосередніх причин порушень репродуктивного здоров'я, ускладненого перебігу вагітності провідне місце посідає субклінічна недостатність вітамінів В1, В6, В12, яка є однією з причин виникнення дисбіозу піхви [6], ендотеліальної дисфункції, дисметаболических зрушень в організмі жінки, фетоплацентарному комплексі та ланцюгом патогенетичного кола переважної більшості акушерсько-гінекологічних і перинатальних ускладнень.

Дефіцит вітамінів під час вагітності негативно позначається на формуванні зародка, розвитку ембріона, плода, підвищує ризик перинатальної патології, дитячої смертності, є однією із причин виникнення вроджених вад розвитку.

Метою дослідження було підвищення ефективності комплексної профілактики акушерсько-гінекологічних і перинатальних ускладнень шляхом застосування комплексних вітаміновмістних препаратів.

Матеріали та методи дослідження. Обстежено 90 жінок репродуктивного віку до вагітності та за триместрами гестації: 30 практично здорових з фізіологічним перебігом вагітності, які народили здорових дітей (контрольна група — А); 30 жінок з ускладненим акушерсько-гінекологічним анамнезом та субклінічним дефіцитом вітамінів В1, В6, В12 (група Б) та 30 вагітних (група В), у яких в комплексній профілактиці і терапії акушерських та перинатальних ускладнень застосовували комбінований препарат, до складу якого входять кобамід (кофермент В12), кокарбоксілаза (кофермент В1), піридоксал-5-фосфат (кофермент В6), корнитіл, лізин.

Препарат призначали на етапі преконцепційної підготовки та вагітним в II і III триместрах вагітності за відсутності алергії до вітамінів групи В по 1 капсулі 3 рази на добу впродовж 20-21 дня.

Результати дослідження та їх обговорення. Встановлено супутні фактори розвитку порушень у репродуктивній сфері, ризику акушерських і перинатальних ускладнень у жінок з субклінічним дефіцитом вітамінів: зимово-весняний період запліднення (49,5%), гормональні порушення (37,4%), екстрагенітальна патологія (100%), обтяжений гінекологічний анамнез запальними процесами (42%), лейоміома матки (83,2%), штучне (77,8%) та самовільне (73,3%) переривання вагітності, надмірне вживання медикаментів (69,7%), ускладнений перебіг вагітності (79,6%) та пологів (45,2%).

Дефіцит вітаміну В1 є однією з причин розвитку гіпотрофії плода, енцефалопатій, ензимопатій. Тіамін являється безпосереднім попередником кокарбоксілази (тіаміну фосфата), що є кофактором дегідрогеназ, складових нуклеїнових кислот, нуклеотидів, жирних кислот, ацетилхоліна. Вітамін В1 активно транспортується через плаценту, швидко перетворюється в організмі плода в кокарбоксілазу.

У контрольній групі А вміст вітаміну В1 був у межах референтних величин і таким залишався впродовж всієї вагітності, але мав чітку тенденцію до зниження за триместрами гестації.

В групі Б рівень вітаміну В1 до вагітності знаходився на рівні нижньої межі норми. У I-му триместрі вагітності він був достовірно нижчим ($p < 0,01$) по відношенню до групи А у 8,2 рази, у II-му триместрі – у 9,7 рази, у III-му – у 8,0 рази.

У групі В внаслідок проведеної передконцепційної підготовки вміст вітаміну В1 був у межах референтних величин. У I-му, II-му, III-му триместрах гестації рівень вітаміну В1 був у 1,3; 1,4; 1,4 рази нижчим, ніж у контрольній групі А ($p < 0,05$). Однак, незважаючи на деяке зниження його рівня відносно контрольної групи, він знаходився у межах референтних величин.

Вітамін В6 (піридоксин) володіє нейропротекторною та антиоксидантною дією, бере участь у жировому й азотному обмінах, синтезі серотоніну і гамма-аміномасляної кислоти (фактор гальмування ЦНС), перетворенні триптофана в серотонін і нікотинову кислоту; входить до складу трансаміназ і декарбоксилаз у вигляді коферментів. Нестача піридоксину призводить до порушення процесів інактивації естрогенів у печінці.

У контрольній групі А вміст вітаміну В6 був у межах фізіологічної норми і таким залишався впродовж всієї вагітності, але достовірно знижувався за триместрами гестації.

В групі Б рівень вітаміну В6 до вагітності свідчив про наявність субклінічного дефіциту ($14,2 \pm 1,3$ нмоль/л). У I-му триместрі його рівень був достовірно нижчим ($p < 0,01$) по відношенню до групи А у 4,7 рази, у II-му триместрі - у 4,8 рази, у III-му - у 3,6 рази, що розцінювалось як субклінічний дефіцит вітаміну В6 під час вагітності.

У групі В у I-му, II-му, III-му триместрах гестації, виходячи з фізіологічних показників норми, рівень вітаміна В6 був у 1,8; 2,1; 1,9 рази нижчим, ніж у контрольній групі А ($p < 0,05$). Однак, враховуючи референтні показники, його рівень знаходився у межах фізіологічної норми.

Вітамін В12 – це група Со-вміщуючих кориноїдів, що відіграють основну роль в трансметилуванні. Вітамін забезпечує синтез ліпопротеїдів в мієліновій тканині, входить до складу редуктаз, що переводять фолієву кислоту в тетрафолієву; приймає участь в синтезі білків, ферментів, янтарної кислоти, бере участь

у синтезі метилірованих сполук, у процесі еритропоезу, стимулює утворення метіоніну та холіну. Дефіцит ціанокобаламіну знижує синтез нуклеїнових кислот, призводить до розвитку анемії за мегалобластичним типом, жирової інфільтрації печінки, лейоміом матки, ембріопатій, дисфункції плаценти, затримки розвитку плода, передчасних пологів.

Фізіологічна норма вмісту ціанокобаламіну в крові складає 140-914 пг/мл. Згідно цьому, концентрація вітаміну В12 у вагітних контрольної групи А до вагітності та протягом гестації була у межах референтних величин, маючи тенденцію до зниження його вмісту.

У групі Б рівень вітаміну В12 до вагітності був нижче норми (стан субклінічної форми дефіциту). У I-му триместрі його рівень знизився до $133,2 \pm 5,3$ пг/мл. До III-го триместру відмічалось різке падіння ($p < 0,05$) вмісту ціанокобаламіну по відношенню до контрольної групи (в середньому - 1,3 рази) та до вихідного рівня (в 1,2 рази).

У групі В внаслідок проведення передконцепційної підготовки рівень вітаміну В12 перед запліднення склав $204,2 \pm 10,2$ пг/мл. В динаміці прогресування вагітності спостерігалась чітка тенденція до зниження його вмісту, однак, включення у комплексну профілактику акушерсько-перинатальних та гінекологічних ускладнень запропонованого препарату утримувало його вміст на рівні фізіологічної норми.

Проведена передконцепційна підготовка та застосування комбінованого препарату під час вагітності дозволила знизити частоту акушерсько-перинатальних ускладнень внаслідок стабілізації метаболічних процесів.

Ефективність проведених заходів по профілактиці акушерсько-перинатальних ускладнень у вагітних з дефіцитом вітамінів В1, В6, В12 була слідуючою. Клінічні ознаки гестаційної анемії та пієлонефриту у групі В були у 2,1 рази менші, ніж при стандартній терапії. Загроза переривання вагітності та часткове відшарування хоріона в I триместрі були діагностовані у 26,7% у групі Б та у 3,3% групи В, що було у 8,1 рази менше.

Загроза передчасних пологів та передчасні пологи у групі Б були у 63,3% та 46,7% спостережень відповідно. У групі В загроза передчасних пологів спостерігалась у 16,7% (у 3,8 рази менше по відношенню до групи Б), а пологи у всіх вагітних групи В наступили в строк.

В групі Б плацентарна дисфункція протягом II-го та III-го триместрів вагітності діагностована у 100% жінок і характеризувалась наявністю гіпотрофії плаценти у 30,0% випадках; маловоддям - у 26,7%; синдромом затримки росту плода - у 36,7%; хронічним дистресом плода - у 56,7%; гострим дистресом плода - у 16,7%.

У групі В плацентарна дисфункція в III-му триместрі виявлена у 3,7 рази менше (26,7% випадків), гіпотрофія плаценти - у 1,5 рази (20,0%), маловоддя - у 13,3%, синдром затримки росту плода - у 3,7 разів (10,0%), хронічний дистрес плода - у 5,7 рази (10,0%), ніж у групі Б. Ознак гострого дистресу плода не виявлено.

Передчасне відшарування плаценти діагностовано у 13,3% вагітних групи Б; слабкість пологової діяльності - у 66,7%; передчасне вилиття навколоплідних вод - у 80,0 % відповідно. У групі В передчасного відшарування плаценти не діагностовано, а слабкість пологової діяльності та передчасне вилиття навколоплідних вод спостерігалось у 6,7% та 16,7% випадків, що було у 10,0 та 4,8 рази менше, ніж в групі Б.

Ускладнення в після пологовому періоді у вигляді субінволюції матки у групі Б склало 23,3%, а у групі В післяпологових ускладнень не діагностовано.

Висновки:

1. Для зниження ймовірності виникнення акушерсько-гінекологічних і перинатальних ускладнень у вагітних з гіповітамінозом В1, В6, В12 необхідно виділення груп ризику, проведення передконцепційної підготовки та включення запропонованих заходів у комплексний профілактично-лікувальний алгоритм ведення вагітності у даної категорії жінок.

2. Важливою є своєчасність проведення профілактичних заходів та їх індивідуалізація з урахуванням особливостей вихідного стану організму жінки, етіологічних чинників та конкретних ускладнень в репродуктивній сфері.

3. Застосування комбінованого препарату, до якого входять кобамід (кофермент В12), кокарбоксілаза (кофермент В1), піридоксал-5-фосфат (кофермент В6), корнитіл і лізин, в складі комплексної профілактики і терапії акушерських, гінекологічних і перинатальних ускладнень є етіопатогенетично обгрунтованим і його слід проводити як на етапі прекоцепційної підготовки, так і продовжувати у II та III триместрах вагітності.

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Distribution of genotypes frequencies of polymorphic loci of C-174G gene of interleukin-6 in patients with coronary heart disease and obesity

Abstract

The article evaluated the distribution of genotype frequencies of polymorphic loci C-174G gene interleukin-6 in patients with coronary heart disease and obesity by means of examination of 222 patients.

Keywords: polymorphic loci of C-174G gene of IL-6, coronary heart disease, obesity.

Introduction. Coronary heart disease (CHD) – one of the most common causes of mortality in the developed world, which draws the attention to the study of the pathogenesis of CHD [1].

There are many risk factors of progression of CHD, but still the cause and trigger mechanisms of acute coronary complications are failed to fully explain. Recently inflammatory theory of atherosclerosis is widely discussed [2, 3].

The inflammatory theory of atherogenesis is confirmed by the increase of inflammatory response markers in the blood concentration in patients with CHD – C-reactive protein, neopterin, interleukin-6 (IL-6), fibrinogen and others [4]. Destabilization of atherosclerotic plaques is determined by the high activity of chronic inflammation. The multifunctional cytokines, stimulating proliferation of T-lymphocytes, macrophages, endothelial cells is IL-6 [5]. It affects the hematopoietic progenitor cells and acts as a growth factor and differentiation of B-lymphocytes, hepatocytes and neurons. The activation of endothelial cells, monocytes and pro-coagulating reactions occur with IL-6 help. IL-6 modulates immunological processes, inflammation, proliferation and apoptosis [6].

It is assumed that the concentration of IL-6 is primarily regulated at the level of transcription and translation. Thus, detection of single nucleotide polymorphisms (SNP) in the promoter region of the gene IL-6 provide an opportunity to examine some of its alleles as risk factors for CHD, diabetes and obesity [7]. A recent study showed an association of polymorphism rs2069840 3-174G with diabetes among residents of Augsburg (Germany) [8], Native Americans and white Spaniards [9].

However, data on the frequency of distribution of genotypes of polymorphic loci of C-174G gene of IL-6 and its pathogenetic importance in the development of CHD in patients with obesity we have not found, that led to further research.

The purpose – to assess the frequency of distribution of genotypes of polymorphic loci of C-174G gene of interleukin-6 in patients with coronary heart disease and obesity.

Materials and methods. A comprehensive survey of 222 patients with CHD and obesity who were treated in the cardiology department of Kharkiv City Clinical Hospital №27, which is the base of the Department of Internal Medicine №2 and Clinical Immunology and Allergology of Kharkiv National Medical University of Ministry of Health of Ukraine is conducted. Comparison group consisted of 115 patients with coronary artery disease with normal body weight. The control group included 35

healthy individuals. The groups were comparable in age and sex. The study excluded patients with severe concomitant diseases of the respiratory and digestive systems, kidneys and those with cancer.

The diagnosis is established in accordance with existing protocols of Ministry of Health of Ukraine.

Research polymorphic locus of genotypes C-174G gene of IL-6 was performed by PCR with electrophoretic detection results using reagent kits "SNP-Express" produced by SPC "Liteh" (Russia). DNA isolation from whole blood was performed using the reagent "DNA EXPRESS" produced by SPC "Liteh" (Russia) according to the instructions. The correctness of the frequency of distribution of genotypes was determined by compliance equilibrium Hardy-Weinberg ($p_i^2 + 2 p_i p_j + p_j^2 = 1$). According to the Helsinki Declaration, all patients were informed about the clinical trial and agreed to determine gene polymorphisms investigated.

Statistical data processing was carried out using the package Statistica, version 6.0. To compare the distribution of genotypes and allele frequencies between groups χ^2 Pearson and Fisher were used criteria. To determine the relative risk of diseases the odds ratio (OR) was calculated. As no association we considered OR = 1; a positive association – OR > 1; as negative allele or genotype association with disease (low risk of the disease) as OR < 1. Trusting interval (TI) is a range of values within which a probability of 95% there is a predictive value of OR. We considered statistically significant differences at $p < 0.05$.

Results and discussion. The distribution of genotype frequencies of polymorphic loci of C-174G gene of IL-6 in patients in the control group corresponded to the expected at Hardy-Weinberg equilibrium (Table 1).

In the control group allele C of polymorphic locus of C-174G gene of IL-6 was observed in 19 persons, accounting 54.29%, allele G – in 16 (45.71%) and genotype C/C, C/G and G/G was distributed as: 9 (25.71%), 19 (54.29%) and 7 (20%), respectively. In patients with CHD allele C was presented in 41 patients (35.65%) and allele G – in 74 (64.35%), genotype C/C – in 15 (13.04%), genotype C/G – in 54 (46.96%) and genotype G/G – in 46 (40%) patients. Combined course of CHD and obesity was characterized by appearance of allele C in 62 patients (27.93%), allele G – in 160 patients (72.07%) and genotype C/C, C/G and G/G – in 24 (10.81%), 67 (30.18%) and 131 (59.01%) patients, respectively.

Comparative analysis showed that in patients with CHD allele C and genotype C/C are less likely to find on 18.64% and 12.67% than in the control group, and the allele G and genotype G/G – more often on 18.64% and 20% ($p < 0.05$). In patients with CHD and obesity prevalence of all alleles and genotypes differed significantly from the distribution in the control group ($p < 0.05$). Thus, the allele C and genotype C/C, C/G were found less frequently in patients with comorbid course of obesity and CHD compared with the control group on 26.36%, 14.9% and 24.11% respectively, and allele G and genotype G/G, on the contrary – more often on 26.36% and 39.01%. More frequently in patients with CHD and obesity on 19.01% we observed genotype G/G and less on 16.78% genotype C/G compared with patients with CHD without obesity ($p < 0,05$).

Table 1

The frequency of alleles and genotypes of polymorphic loci of C-174G gene of IL-6 in the groups of patients and in the control group

Genetic markers	CHD (n=115)	CHD + obesity (n=222)	Control group (n=35)
Allele C	41 (35.65 %)*	62 (27.93 %)*	19 (54.29 %)
Allele G	74 (64.35 %)*	160 (72.07 %)*	16 (45.71 %)
Genotype C/C	15 (13.04 %)*	24 (10.81 %)*	9 (25.71 %)
Genotype C/G	54 (46.96 %)	67 (30.18 %)*#	19 (54.29 %)
Genotype G/G	46 (40 %)*	131 (59.01 %)*#	7 (20 %)

Note: * – the likelihood of differences between the comparison group and the control group ($p < 0,05$); # – the likelihood of differences between comparing groups ($p < 0,05$).

Thus, the allele G and genotype G/G of polymorphic locus of C-174G gene of IL-6 are associated with the development of CHD and obesity.

The presence of allele G and G/G genotype of polymorphic loci of C-174G gene in patients with CHD with concomitant obesity was associated with the development of heart failure, respectively (OR = 2.55, 95% TI = [1.72–3.79], $\chi^2 = 22.8$, $p < 0.05$) and (OR = 11.95, 95% TI = [3.41–41.91], $\chi^2 = 22.5$; $p < 0.05$), while allele C was associated with decreased risk of heart failure (OR = 0.39, 95% TI = [0.26–0.58], $\chi^2 = 22.75$; $p < 0.05$) (Table 2).

Table 2

The value of allele G, C and the genotype G/G of polymorphic locus of C-174G gene of IL-6 in the development of heart failure in patients with CHD and obesity

Genetic markers	OR (95 % TI)
Allele G	2.55 (1.72–3.79)
	$\chi^2=22.8$; $p<0.05$
Allele C	0.39 (0.26–0.58)
	$\chi^2=22.75$; $p<0.05$
Genotype G/G	11.95 (3.41–41.91)
	$\chi^2=22.5$; $p<0.05$

Our results are confirmed by other works devoted to the analysis of relationships of polymorphism of C-174G gene of IL-6 with risk of cardiovascular diseases and its progression. Thus, in the research of Berezikova KM [10] the role of genotype G/G of polymorphic locus of C-174G gene of IL-6, as genetic predisposition to the leading pathogenetic mechanism of ischemic dysfunction and heart failure was established. This indicates the importance of genotype predictors in the early diagnosis of heart failure of ischemic genesis. There is evidence on the relationship of polymorphism of IL-6-174G/C with increased risk of CHD. Men with genotype C/C have higher risk of CHD than ones with the genotype G/G, accounting for 1.54 (95% TI 1.0–2.23; $p = 0.048$), and the highest in smokers – 2.66 (95% TI 1.64–4.32) [11]. In addition, there is evidence of increased levels of IL-6 in 6 hours after coronary artery bypass grafting in the presence of genotype 572S and 174S [12], an association of polymorphisms of C-174G gene of IL-6 for genotype C/C and increased frequency of cardio-vascular complications (revascularization, MI, death; HR – 3.58) in chronic hemodialysis patients [13]. In another study the relationship between genotype G/G and the development of atrial fibrillation after surgery on coronary arteries is established [14].

Therefore, it should be noted that the existence of contradictory data in different populations in the study of genetic determination of heart failure with CHD may be due not only to existing differences in the selection criteria and protocols of comparing group of formation, but of great value are the influence of non-genetic factors, national characteristics and also the multivariable complex mechanisms of congestive heart failure dependent on a number of molecular-genetic factors, creating conditions for

complex pathophysiological gene-gene interactions being the subject of active study in recent years.

Conclusions. Allele G and genotype G/G of polymorphic locus of C-174G gene of IL-6 are associated with the development of CHD and heart failure.

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Periodontoprotective effect of oral applications of lipopolysaccharide

Abstract: The data of the therapeutic and preventive effect of mucosa-adhesive gel, containing lipopolysaccharide upon the state of periodontium and level of inflammatory reaction in oral tissues in 12-years old children with different index of body

weight are given in the article. The oral applications of phytogel "Pyrogenal" were determined to reduce considerably the level of pathological processes in periodontium of children due to activation of physiological inflammation.

Keywords: children, phytogel, periodontium, inflammation.

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***Пародонтопротекторное действие оральных
аппликаций липополисахарида***

Аннотация: В статье представлены данные о лечебно-профилактическом действии мукозо-адгезивного геля, содержащего липополисахарид на состояние пародонта и уровень воспалительной реакции в тканях полости рта у детей 12 лет с разным показателем индекса массы тела. Установлено, что оральные аппликации фитогеля «Пирогенал» существенно снижают уровень патологических процессов в пародонте детей за счет активизации физиологического воспаления.

Ключевые слова: дети, фитогель, пародонт, воспаление.

В нашей предыдущей работе [1] было показано, что у детей с низким уровнем воспалительной реакции в тканях полости рта воспалительно-дистрофические изменения в пародонте проявляются в существенно большей степени.

Известно, что воспалительная реакция выполняет защитную функцию в организме [2, 3]. Мы предположили, что недостаточный уровень воспалительной реакции может быть причиной формирования хронического пародонтита.

Как известно, одним из важнейших индукторов воспаления является кишечный эндотоксин (липополисахарид, ЛПС), который вырабатывается условно патогенными грам-отрицательными бактериями [4, 5]. Уже в дозах в мкг/кг он вызывает развитие воспалительной реакции, проявляющейся усилением антимикробного потенциала за счет активных форм кислорода [6, 7].

Целью настоящего исследования стало определение лечебно-профилактического действия мукозо-адгезивного геля, содержащего ЛПС, на состояние пародонта и уровень воспалительной реакции в тканях полости рта у детей с разным показателем ИМТ. Препарат «Пирогенал», содержащий ЛПС, предложен для активации хронического воспаления путем воздействия на ретикуло-эндотелиальную, гипоталамо-гипофизарную и фибринолитическую системы. Он активирует макрофаги, нейтрофилы и используется в качестве неспецифического средства при лечении самых различных заболеваний [8, 9].

Материалы и методы исследования

Нами был обследован 151 учащийся 6-7 классов обоего пола в двух школах (79 детей в г. Одессе, гимназия № 1, и 72 – в г. Ильичевске, школа № 6). Для обследования использовали стандартный набор инструментов и стандартные методики [10, 11]. Определяли пародонтальные и гигиенические индексы (РМА,

кровоточивость десен, проба Шиллера-Писарева, СРІТN, индекс Silness-Loe, индекс Stallard), а также в смешанной слюне – уровень маркеров воспаления (МДА, эластаза [12]), микробного обсеменения (уреаза [13]) и неспецифического иммунитета (лизоцим [13]).

В качестве геля ЛПС использовали мукозо-адгезивный фитогель «Пирогенал» с концентрацией 2 мкг/мл ЛПС в дозе 0,5 мл на одну аппликацию на десну (вечером после ужина в течение 2 недель). Стоматологическое исследование, а также биохимический анализ слюны осуществляли сразу и спустя 2 недели после окончания аппликаций. У всех пациентов до начала опыта определяли показатель ИМТ по формуле $ИМТ = m/l^2$, m – масса тела, кг, l – рост, м.

Результаты и их обсуждение

В таблице 1 представлены результаты определения показателей РМА и СРІТN, которые свидетельствуют о значительном их снижении после аппликаций геля «Пирогенал». Так, индекс РМА снижался в 2-3 раза, а индекс СРІТN – в 2-4 раза.

Таблица 1

Влияние оральных аппликаций геля с ЛПС на показатели состояния пародонта у детей с разными показателями ИМТ

№ пп	Группы	РМА, %		СРІТN	
		до	после	до	после
Одесса					
1	Норма	16,1±2,8	5,7±1,3 p<0,01	0,20±0,06	0,03±0,02 p<0,05
2	ИМТ>25	19,0±2,3	7,7±1,1 p<0,01	0,19±0,04	0,04±0,02 p<0,05
3	ИМТ<20	20,2±2,3	8,4±1,2 p<0,01	0,28±0,08	0,07±0,02 p<0,01
Ильичевск					
1	Норма	19,7±2,0	11,4±2,0 p<0,05	0,19±0,03	0,09±0,03 p<0,05
2	ИМТ>25	18,2±2,1	9,4±1,5 p<0,01	0,31±0,05	0,15±0,04 p<0,05
3	ИМТ<20	25,2±5,6	13,5±3,2 p<0,05	0,42±0,08	0,13±0,05 p<0,05

В таблице 2 представлены результаты определения индекса кровоточивости и пробы Шиллера-Писарева у детей, получавших аппликации геля «Пирогенал». Видно, что индекс кровоточивости снижается в 3-7 раз (г. Одесса) и в 2-3 раза (г. Ильичевск). Индекс Шиллера-Писарева несколько снижается (в 1,1-1,3 раза).

В таблице 3 представлены результаты определения индексов, из которых видно, что эти индексы достоверно снижаются (в 1,5-2 раза), независимо от показателя ИМТ.

В таблице 4 представлены результаты определения уровня кариеса и гигиены полости рта. Из этих данных видно, что эти показатели после курса аппликаций геля «Пирогенал» снижаются в 1,2-2 раза.

Таблица 2

Влияние оральных аппликаций геля с ЛПС на дентальные индексы детей с разными показателями ИМТ

№№ пп	Группы	Кровоточивость		Шиллера-Писарева	
		до	после	до	после
Одесса					
1	Норма	0,21±0,06	0,03±0,02 p<0,05	1,20±0,04	1,03±0,01 p<0,01
2	ИМТ>25	0,21±0,04	0,04±0,02 p<0,05	1,13±0,04	1,01±0,02 p<0,05
3	ИМТ<20	0,28±0,05	0,08±0,02 p<0,01	1,32±0,05	1,06±0,03 p<0,01
Ильичевск					
1	Норма	0,21±0,04	0,09±0,03 p<0,05	1,24±0,04	1,07±0,02 p<0,01
2	ИМТ>25	0,32±0,06	0,16±0,04 p<0,05	1,23±0,05	1,09±0,02 p<0,05
3	ИМТ<20	0,43±0,06	0,14±0,05 p<0,01	1,38±0,08	1,11±0,04 p<0,05

Таблица 3

**Влияние оральных аппликаций геля с ЛПС на показатели индексов
гигиены у детей с разными показателями ИМТ**

№ пп	Группы	Silness-Loe		Stallard	
		до	после	до	после
Одесса					
1	Норма	0,97±0,11	0,46±0,09 p<0,01	1,11±0,16	0,44±0,09 p<0,01
2	ИМТ>25	0,93±0,07	0,53±0,07 p<0,01	0,97±0,13	0,57±0,10 p<0,05
3	ИМТ<20	1,09±0,09	0,53±0,07 p<0,01	1,15±0,10	0,74±0,08 p<0,05
Ильичевск					
1	Норма	1,06±0,09	0,71±0,09 p<0,05	1,28±0,09	0,85±0,11 p<0,05
2	ИМТ>25	1,23±0,10	0,85±0,11 p<0,05	1,31±0,08	1,07±0,09 p>0,05
3	ИМТ<20	1,37±0,12	0,70±0,15 p<0,05	1,42±0,13	0,87±0,13 p<0,05

Таблица 4

**Влияние оральных аппликаций геля с ЛПС на уровень кариеса и оральной
гигиены у детей с разными показателями ИМТ**

№№ пп	Группы	Кариес		Уровень гигиены	
		до	после	до	после
Одесса					
1	Норма	1,65±0,38	1,10±0,40 p>0,3	1,19±0,15	0,53±0,09 p<0,01
2	ИМТ>25	1,37±0,37	0,63±0,20 p>0,05	1,08±0,08	0,70±0,08 p<0,05
3	ИМТ<20	2,10±0,47	1,21±0,34 p>0,05	1,29±0,09	0,79±0,08 p<0,01
Ильичевск					
1	Норма	1,64±0,31	0,98±0,17 p>0,05	1,33±0,05	0,92±0,11 p<0,01
2	ИМТ>25	1,24±0,27	1,00±0,20 p>0,3	1,44±0,08	1,16±0,09 p<0,05
3	ИМТ<20	1,71±0,52	0,86±0,38 p>0,1	1,51±0,12	0,90±0,13 p<0,05

Представленные в таблицах 1-4 данные свидетельствуют о высокой эффективности пирогенала в снижении уровня патологических процессов в тканях пародонта.

В таблице 5 представлены результаты определения маркеров воспаления в ротовой жидкости, которые показывают их рост в 1,5-6 раз, что свидетельствует об активизации воспалительного процесса в тканях полости рта.

В таблице 6 показаны изменения активности уреазы и лизоцима в ротовой жидкости. Видно, что в основном уровень активности этих ферментов мало отличается от исходных величин из-за больших разбросов показателей.

Таблица 5

Влияние оральных аппликаций геля с ЛПС на уровень маркеров воспаления в ротовой жидкости детей с разными показателями ИМТ

№ пп	Группы	Эластаза		МДА	
		до	после	до	после
Одесса					
1	Норма	0,20±0,02	0,37±0,07 p<0,05	0,20±0,02	0,29±0,10 p>0,05
2	ИМТ>25	0,08±0,01	0,32±0,04 p<0,05	0,16±0,02	0,30±0,08 p<0,05
3	ИМТ<20	0,07±0,01	0,48±0,12 p<0,05	0,13±0,02	0,29±0,05 p<0,05
Ильичевск					
1	Норма	0,15±0,02	0,36±0,06 p<0,05	0,15±0,02	0,17±0,01 p>0,05
2	ИМТ>25	0,17±0,02	0,23±0,02 p<0,05	0,04±0,01	0,12±0,01 p<0,05
3	ИМТ<20	0,18±0,12	0,19±0,12 p>0,5	0,15±0,01	0,14±0,02 p>0,3

Таким образом, нами установлено, что оральные аппликации фитогеля «Пирогенал» существенно снижают уровень патологических процессов в пародонте детей за счет активизации физиологического воспаления. Эти данные подтверждают результаты, полученные у больных с иной патологией [8, 9], и дают

веские основания рекомендовать для массовой профилактики оральные аппликации фитогеля «Пирогенал».

Таблица 6

Влияние оральных аппликаций геля с ЛПС на активность уреазы и лизоцима в ротовой жидкости детей с разными показателями ИМТ

№№ пп	Группы	Уреазы		Лизоцим	
		до	после	до	после
Одесса					
1	Норма	0,071±0,007	0,130±0,118 p>0,3	78±10	69±39 p>0,5
2	ИМТ>25	0,214±0,010	0,133±0,061 p>0,05	147±18	67±18 p<0,05
3	ИМТ<20	0,177±0,014	0,417±0,157 p<0,05	149±20	105±18 p>0,05
Ильичевск					
1	Норма	0,046±0,006	0,045±0,014 p>0,8	83±13	71±14 p>0,5
2	ИМТ>25	0,130±0,011	0,054±0,032 p<0,05	76±12	75±10 p>0,9
3	ИМТ<20	0,120±0,010	0,130±0,092 p>0,5	43±11	32±11 p>0,3

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Correction of immunosuppressive effect of antitumor preparations at prostatic cancer with the help of immune stimulator (experimental research)

Abstract: The work studies influence of the combined and divided antitumor and immunomodulating therapy at prostatic cancer to the antibody synthesis with the help of indirect immunofluorescence by A. Kuns in the organs of lymphoid-macrophage system on experimental models. It was found out that when the antitumor preparations were injected in the lymph glands, spleen, bone marrow and liver, the production of plasma cells was oppressed. At complex injection of antitumor and immunobiological preparations the synthesis of antibodies in liver, lymph glands, bone marrow and spleen was activated from the 5-th day after injecting and reached high index by the 15-th day of supervision.

Keywords: antibody synthesis, antitumor preparations, immunobiological preparations, prostatic cancer, experimental animals.

Urgency. Prostatic cancer is one of serious and the most widespread forms of malignant neoplasms among men with occurrence probability of – 9%, mortality - 4,5%. At the age of 45 it is diagnosed in 10 of 100000 men, and at the age of 75 the burden of disease is quite higher (1400 to 100000). For recent decades the growth of prostatic cancer disease burden is about 3% per year [1].

The main scheme of treatment of the widespread prostatic cancer and hormone-resistant forms of prostatic cancer is chemotherapy with cytostatic preparations, however this kind of therapy has an immunosuppressive side-effect. Among modern methods of malignant neoplasms treatment, which are at the stage of studying and development the most perspective is immunotherapy. An immune system is able to detect and destroy autologous tumor cells. Such a supposition was made on the basis of the

existing messages on the cases of spontaneous remission of various tumors. It was noted that these tumors were infiltrated by leukocytes, mostly by T-cells [2]. The results of experimental and clinical researches of the recent years allow us to state that a body is able to respond to the development of the tumor process with a range of protective reactions. Among protection factors a particulate role belongs to the immune system. Estimation of efficiency of the antitumor therapy is connected with studying of cellular and humoral components, which are able to affect them. For correction of the antibody forming function of lymph organs there is offered a range of preparations, among which the most significant are immunomodulators, they can regulate the immune response. At present the antitumor therapy complex includes immunomodulating preparations.

In order to receive more detailed vision of antibody formation dynamics and ascertain possibilities of their synthesis breach at the cellular level it is necessary to complement the serological building with data of antibody formation directly in the effector organ before entry of the last-mentioned to the blood. In view of this, taking into account insufficient and contradictive quantity of data about influence of antitumor and immunocorrecting therapy to the processes of antibody formation, there was stated an **objective** to study the influence of combined and divided antitumor and immunobiligical preparations to the antibody synthesis in lymph glands, spleen, liver and bone marrow by an experimental model of prostatic cancer.

Materials and methods. Experimental researches were carried out on Wistar line rats, weighting 250 - 300 g [3, 4]. The experiment was carried out in compliance with the national "General Ethical Principles of Experiments on Animals" (Ukraine, 2001), which conform with regulations of the "European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes" (Strasbourg, March 18, 1986) [5]. All experimental animals were divided into 6 groups depending upon the kind of the product material: 1 – control (intact K-), 2 – test group of animals with prostatic cancer (K+) without therapy; 3 group - test group of animals with prostatic cancer – Mitoxantron therapy, 4 group – Docetaxel therapy, 5 group – Mitoxantron + Glutoxim therapy; 6 group – Docetaxel + Glutoxim. Definition of antibody formation was carried out with the help of indirect method by A. Kuns (indirect immunofluorescence of antibodies) [6, 7, 8]. The researches were carried out in dynamics of the 5-th, 10-th and 15-th day from the beginning of preparations injection. The findings were statistically treated with help of computer programs [9].

Results. Studying of the antibody forming cells content in lymph glands, spleen, bone marrow and liver at antitumor and immunobiological preparations (per se and combined) allowed to determine that antibody forming cells content in bone marrow and lymph glands when injected Mitoxantron + Glutoxim did not change significantly on the 5-th day comparing to the group of animals which were injected with Mitoxantron (table 1).

Table 1

Effect of antitumor and immunobiological preparations on the antibody synthesis in the organs of lymphoid-macrophage system at prostatic cancer (experimental research)

Supervision day	Groups	Organs			
		Lymph glands	Liver	Spleen	Bone marrow
5-th day	1 group	52,4±0,9	56,8±0,2	50,8±0,6	55,6±0,9
	2 group	40,8±0,6	42,6±0,7	36,8±0,4*	38,4±0,6*
	3 group	32,5±0,4*	30,2±0,9*	31,6±0,7*	29,8±0,4*
	4 group	31,6±0,2*	36,8±0,8*	29,2±0,9*	34,1±0,7*
	5 group	39,4±0,8*	40,5±0,7*	44,7±0,6*	38,1±0,4*
	6 group	47,1±0,3*	42,4±0,9*	49,8±0,4	42,6±0,9*
10-th day	1 group	58,9±0,4	61,8±0,2	54,9±0,9	60,5±0,4
	2 group	23,3±0,6*	35,3±0,4*	39,5±0,5*	23,4±0,8*
	3 group	13,6±0,8*	12,9±0,5*	22,4±0,3*	18,6±0,2*
	4 group	15,9±0,4*	14,7±0,6*	24,9±0,8*	20,8±0,6*
	5 group	53,8±0,9	57,4±0,8	60,1±0,4	58,1±0,2
	6 group	59,4±0,6	65,6±0,4	62,8±0,7	61,2±0,9
15-th day	1 group	59,1±0,2	60,4±0,8	55,2±0,9	58,4±0,1
	2 group	17,6±0,7*	16,8±0,3*	28,4±0,6*	16,2±0,8*
	3 group	10,5±0,8*	9,4±0,6*	16,5±0,8*	13,1±0,2*
	4 group	11,8±0,4*	9,2±0,9*	18,4±0,2*	14,9±0,6*
	5 group	68,4±0,6	69,8±0,4	70,4±0,9	66,3±0,4
	6 group	69,9±0,8	83,4±0,9	72,8±0,6	67,2±0,8

Note: * - significant difference of indexes from the group of intact control animals (1 group) is $\leq 0,05$.

However, the tendency of antibody forming cells quantity grows in spleen was noted among animals which were injected with Docetaxel and Glutoxim on the 10-th day ($<0,001$). A significant reduction of antibody forming cells was noted in liver and

lymph glands (image 1) of the animals which were injected with Mitoxantron and Docetaxel comparing with the groups of animals, which received a combined therapy.

Not quite the same pictures could be seen at antibody synthesis studying in the organs of lymphoid-macrophage system under influence of Docetaxel + Glutoxim and Mitoxantron + Glutoxim on the 10-th day from the beginning of the preparations injecting.

Maximum quantity of plasma cells with intensively fluorescent protoplasm was detected in bone marrow (Docetaxel + Glutoxim 61,2% and Mitoxantron + Glutoxim 58,1%); spleen (Mitoxantron + Glutoxim 60,1%; Docetaxel + Glutoxim 62,8%); liver (Mitoxantron + Glutoxim 57,4%; Docetaxel + Glutoxim 65,6%); comparing with the same on the 5-th day.

The quantity of fluorescent antibody forming cells in lymph glands of the animals which were injected with Docetaxel and Mitoxantron per se and combined with immunobiological preparation Glutoxim was equatable.



Image 1. Reduction of intensity of antibody forming cells fluorescence in liver (A) and in lymph glands (B) at prostatic cancer of rats of the II group. Indirect method by A. Kuns with homogenous antibodies x 200

As can be seen from the above, on the 10-th day the antibody synthesis in the organs of lymphoid-macrophage system at prostatic cancer was effecting more intensively than with complex injection of antitumor and immunobiological preparations.

When studying antibody formation in the organs under research affected by Docetaxel + Glutoxim and Mitoxantron + Glutoxim on the 15-th day, we should mention that the antibody formation index was credibly augmenting in all organs of the groups

of animals, which had complex combined therapy, a significant antibody synthesis oppression was observed only when injected antitumor preparations perse.

Consequently, when studying antibody synthesis in lymphoid-macrophage system under effect of Docetaxel, Mitoxantron, Docetaxel + Glutoxim; and Mitoxantron + Glutoxim it was found out that when the experimental animals were injected with Docetaxel and Mitoxantron in the lymph glands, spleen, bone marrow and liver the plasmatic cells production was oppressed. When injected Docetaxel and Glutoxim, as well as Mitoxantron and Glutoxim there was activated the antibody synthesis in liver, lymph glands, bone marrow and spleen beginning from the 5-th day of injecting and it had reached high index by the 15-th day of supervision. Moreover, complex injection of preparations contributes to significant increase of antibody synthesis in liver, reaching 83,4%.

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***Combination of solid phase extraction and liquid-liquid
extraction for indirect determination of Pd(II)
in a flame atomic absorption spectrometry***

Abstract

This article is devoted to development of procedures of indirect determination of Pd on detection of the Cu, distinguished during solid phase of reaction. The results obtained in this work demonstrated that the application by combination SPE and LLE preconcentration with a flame atomic absorption spectrometry is a selective and sensitive method for the determination of Pd in waters of different type, including a mine and technological. The method effectively minimized the interference from transitional metal ions without the need of any masking reagents.

Keywords: palladium, dimercaptothiopyrone derivatives, polyurethane foam, preconcentration, indirect flame atomic absorption spectroscopy.

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Комбинация твердофазной и жидкостно-жидкостной экстракции для косвенного определения Pd(II) в пламенной атомно-абсорбционной спектрометрии

Аннотация: Данная статья посвящена разработке методики косвенного определения палладия по детектированию меди, выделенной в ходе гетерофазной реакции замещения. Результаты, полученные в этой работе продемонстрировали, что применение предварительного концентрирования сочетанием твердофазной и жидкостно-жидкостной экстракции (SPE и LLE) с пламенной атомно-абсорбционной спектрометрией (FAAS) – селективный и чувствительный метод определения палладия в водах различного типа, включая шахтные и технологические

Ключевые слова: палладий, производные димеркаптотиопирона, пенополиуретан, предварительное концентрирование, косвенная атомно-абсорбционная спектрометрия.

Современные химические технологии и использование наноматериалов в различных сферах, включая медицину, в настоящее время привело к неконтролируемым выбросам платиновых металлов (ПМ) в окружающую среду и представляет опасность для здоровья человека [1]. Автомобильные катализаторы – главные антропогенные источники следов ПМ в окружающей среде [2]. Seriously ухудшают состояние экосистем шахтные воды. В Донбассе с этими потоками в природные водоемы ежегодно попадает около миллиона тонн солей щелочно-земельных и тяжелых металлов. В водные объекты с шахтными водами по оценке специалистов поступает около 600 кг/год палладия [3].

Обнаружение следовых количеств Pd в различных объектах вызвало значительный интерес в последние годы, и важный шаг при этом – выбор соответствующей аналитической техники. Описаны инструментальные методики с использованием атомно-абсорбционной спектрометрии с пламенной (FAAS) [4-6] и электротермической атомизацией (ETAAS) [7, 8], включая (GFAAS) [9], а также оптической эмиссионной спектрометрии с индуктивно связанной плазмой (ICP-OES) [8,10-11]. По сравнению с другими методами FAAS обладает некоторыми экстраординарными преимуществами: быстрый и приемлемый ответ,

относительная простота и низкая стоимость. Прямое определение ПМ, включая Pd, в сложных объектах этими методами обычно затруднено, и для повышения чувствительности необходимо предварительное концентрирование аналита, например, сорбционное, которое позволяет упростить матрицу, снизив при этом пределы обнаружения. Для определения следовых количеств Pd в экологических объектах описано комбинирование FAAS с дисперсионной жидкостно-жидкостной микроэкстракцией (dispersive liquid-liquid microextraction, DLLME) [12] или соосаждением [13]. В работе [14] предложено селективное определение Pd методом GFAAS в комбинации с рассеивающей DLLME (D-DLLME). Диэтилдитиокарбамат (DDTK) был выбран как хелатирующий агент, а ионы меди – для предварительного концентрирования. При этом использовали устойчивость комплексов Pd и Cu с DDTK.

Производные димеркаптопиона (DT) являются эффективными модификаторами матриц различной природы. С использованием бумажных носителей, модифицированных DT, показана эффективность метода динамического концентрирования, разделения и последующего определения Pd(II) и Pt(IV) [15], разработан высокоселективный и чувствительный тест-метод для определения Au(III) [16]. Получен новый гибридный органо-полимерный сорбент на основе метилкремниевой кислоты, модифицированной DT для определения микропримесей Pd(II) в варианте индикаторной трубки [17].

В этой работе пенополиуретан (PUF) выбран в роли матрицы-носителя, а комплекс Cu(II) с 3-фени-2,6-димеркапто-1,4-тиопионом (PhDT) – как ее модификатор для твердофазной экстракции Pd(II). В обзорах [18, 19] обобщены данные о сорбционных свойствах ППУ, включая их модифицированные формы. При этом основанием для разработки нового подхода к определению Pd методом AAS было использование особенностей комплексообразования халькофильных металлов с PhDT и устойчивости комплексов металл-PhDT [16].

В подавляющем большинстве методик, сочетающих сорбционное концентрирование с последующим определением Pd методом AAS, анализировали элюат, содержащий данный микрокомпонент. Возможность использования гетерофазных заместительных реакций с учетом устойчивости комплексов металл-PhDT, для нас была привлекательна. Такой подход использовали авторы работы [14] в первом шаге концентрирования Pd. Кроме того, в случае использования DT

открывалась возможность разработки методики косвенного определения Pd методом AAS и при этом – снижения предела обнаружения данного металла. Использование в анализе косвенных методов AAS и их особенности обсуждалось в публикациях [20]. Поиск и использование чувствительных и селективных предварительных химических реакций аналита со вспомогательными веществами способствует эффективному развитию и применению косвенных методов AAS. Определение такого аналита не представляет особых затруднений, если молярное соотношения реагентов вспомогательной реакции известно.

Цель настоящей работы – разработка методики косвенного определения Pd(II) методом FAAS в комбинации с твердофазной экстракцией (solid phase extraction, SPE) пенополиуретаном и жидкостно-жидкостной экстракцией (liquid-liquid extraction, LLE) ионов меди, элюированных в ходе гетерофазной заместительной реакции.

Экспериментальная часть

Реагенты, растворы и аппаратура. PhDT синтезировали и очищали согласно [21], растворяли в 0.3 М КОН и стандартизовали амперометрически с помощью соли висмута(III) [16]. Для импрегнирования PUF использовали 0.005 М щелочной раствор PhDT, полученный разбавлением исходного дистиллированной водой, и раствор Cu(II) с концентрацией 0.005 моль/л, который готовили растворением точной навески $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ (х.ч) в растворе H_2SO_4 (0.05 моль/л). Градуировочные растворы меди в интервале концентраций 0.05–5 мкг/мл готовили из растворов стандартных образцов МСО 0523:2003 с концентрацией 1.00 мг/мл разбавлением непосредственно перед прямым определением Cu методом FAAS. Стандартный раствор Pd(II) с концентрацией 1000 мг/л готовили растворением 1.664 г точной навески PdCl_2 (х.ч) в небольшом количестве 2 М HCl и доводили бидистиллированной водой до метки в мерной колбе емкостью 1 л и стандартизовали амперометрически с помощью PhDT [17]. Растворы с меньшей концентрацией готовили разбавлением исходного фонового электролитом в день эксперимента. Для создания необходимой кислотности готовили стандартные ацетатные буферные смеси (pH 3.6–6); pH 1 создавали 0.1 М HCl; буферный раствор с pH 2 получали смешиванием 1 М CH_3COOH с 1 М NH_3 ; растворением точной навески $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ готовили 0.01 М раствор и доводили его до pH 3

с помощью HCl; растворы кислот с различной концентрацией получали разбавлением концентрированных HCl, H₂SO₄, и HNO₃ (х.ч).

В качестве матрицы-носителя использовали PUF на основе простых эфиров (торговая марка 5–30, ОАО Радикал, Киев) в виде таблеток, которые вырезали из промышленного листа полимера (высота 5 мм, диаметр 10 или 16 мм; масса 10 ± 2 или 30 ± 2 мг). Для очистки от примесей таблетки PUF выдерживали в 1 М HCl в течение 1 ч, промывали бидистиллированной водой до pH 5–6, просушивали между листами фильтровальной бумаги и высушивали до воздушно-сухого состояния. Полученные таблетки хранили в темном месте.

pH контролировали на иономере И-130 (Гомель, Беларусь) со стеклянным и хлоридсеребряным электродами. Контроль за распределением металлов между PUF и водной фазой, а в случае экстракции меди – водной и амилацетатной фазами осуществляли по анализу водной фазы методом FAAS на спектрофотометре AAnalyst 200 (Perkin-Elmer, США) с дейтериевым корректором фона в пламени воздух-ацетилен в условиях, рекомендованных изготовителем. Использовали лампы с полым катодом для Ag (4.0 мА), Cu (5 мА), и Pd (5 мА). Атомное поглощение измеряли по резонансной линии 328.1, 324.7 и 244.8 нм при ширине щели 0.4, 0.5 и 0.3 нм для Ag, Cu и Pd соответственно. Также определяли Pd методом GFAAS с использованием спектрометра Perkin-Elmer Zeeman/4100 ZL, снабженного автоматизированной зеемановской графитовой печью, автоматической системой подачи проб AS-70 и лампой с полым катодом (25 мА), для измерения абсорбции в условиях, рекомендованных изготовителем при 247.6 нм и спектральной шириной щели 0.7 нм.

Процедуры

Импрегнирование PUF комплексами меди. Очищенные от примесей таблетки PUFs погружали в щелочной 0.005 М раствор PhDT, слегка отжимали стеклянной палочкой и помещали в раствор 1 М HCl. Через 2–3 мин таблетку вновь отжимали, тщательно промывали бидистиллированной водой и погружали на 10 мин в 0.005 М Cu(II) в растворе 0.1 М HCl, при этом они изменяли свой желтый цвет на красно-коричневый. Тщательно промывали бидистиллированной водой до отрицательной реакции ионов меди с дитизоном в промывочной воде, просушивали с помощью фильтровальной бумаги до воздушно-сухого состояния и сохраняли в стеклянных бюксах в темном месте.

Определение сорбционной емкости. Поскольку в кислой среде Ag(I) образует комплексы с молярным соотношением Ag(I):PhDT = 1:1, то определение сорбционной емкости PUF по PhDT ($\alpha_{\text{PUF}}^{\text{PhDT}}$) проводили в статическом режиме сорбции Ag(I) таблетками PUF, модифицированными PhDT, в избытке данного иона и последующего количественного определения его остатка методом FAAS. Для этого в стаканчик емкостью 25 мл помещали 10 мл 2×10^{-4} М Ag(I) в 0.1 М HNO₃, вносили таблетку PUF (10 мг), с помощью стеклянной палочки удаляли пузырьки воздуха и 30 мин перемешивали раствор на магнитной мешалке. Содержание Ag в данном растворе определяли методом FAAS. С учетом материального баланса рассчитывали сорбционную емкость (мкмоль/г) PUF по серебру ($\alpha_{\text{PUF-PhDT}}^{\text{Ag}}$) и, соответственно, по PhDT ($\alpha_{\text{PUF}}^{\text{PhDT}}$). Степень извлечения ($R, \%$) и сорбционную емкость $\alpha_{\text{PUF-PhDT}}^{\text{Pd}}$ и $\alpha_{\text{PUF-PhDT}}^{\text{Pd}}$ также оценивали по уменьшению содержания металла в объеме раствора до и после сорбции методом FAAS.

Влияние кислотности на реакцию гетерофазного замещения с участием комплекса Cu с PhDT. В стаканчик емкостью 25 мл помещали 10 мл анализируемого раствора Pd(II) с концентрацией 1×10^{-5} М в фоновом электролите, вносили таблетку PUF, импрегнированную комплексами Cu с PhDT, с помощью стеклянной палочки удаляли пузырьки воздуха и 30 мин перемешивали раствор на магнитной мешалке. Содержание Cu и Pd в данном растворе определяли методом FAAS, а в ряде случаев – GFAAS.

SPE Pd(II). В медицинский шприц помещали таблетку PUF ($m = 10$ мг), импрегнированного комплексами Cu с PhDT, с помощью штока затягивали из пробирки 10 мл раствора Pd(II) с концентрацией в интервале 0.05–2.1 мг/мл в 5 М HCl и многократно прокачивали аналит через таблетку сорбента.

Оптимизация LLE Cu(II). В делительную воронку вводили 10 мл стандартного раствора Cu(II) с концентрацией 0.06 мкг/мл в 5 М HCl и различные объемы экстрагента. Для выбора оптимальной концентрации экстрагента и его объема варьировали содержание PhDT в интервале от 0.005–0.1% в 0.5–1 мл амилацетата, при этом за оптимальные были приняты условия, отвечающие максимальной величине атомного поглощения. По постоянству его величины устанавливали оптимальное время контакта фаз.

Получение градуировочного графика для определения меди методом FAAS с предварительным экстракционным концентрированием. 10 мл стандартного раствора Cu(II) с концентрацией в интервале 0.03–1.7 мкг/мл в 5 М HCl вносили в делительную воронку, прибавляли 0.5 мл 0.2% PhDT в амилацетате и встряхивали смесь в течение 1 мин. После расслоения фаз отделяли нижний водный слой, к экстракту прибавляли по каплям 1 мл горячей HNO₃ (1:1) и после рекстракции меди отделяли нижний слой, фильтруя его через беззольный фильтр «синяя лента», а затем последний промывали бидистиллированной водой. Фильтрат собирали в градуированную пробирку, упаривали при слабом нагревании почти досуха, добавляли 1 мл HCl (1:2), доводили 1%-ным раствором HNO₃ (ос.ч) до объема 5 мл, измеряли атомное поглощение и строили график его зависимости от концентрации для интервала 0.06–3.4 мкг/мл.

Обсуждение результатов

Модифицирование PUF. В исходном водном щелочном растворе DT и PhDT в том числе устойчивы и хранятся длительное время (до нескольких лет) без изменения титра (например, тиокетон Михлера – известного реактива на халькофильные металлы, неустойчив в водных растворах), а также устойчивы в иммобилизованном виде на различных матрицах-носителях (от нескольких месяцев, а в ряде случаев и более года), как показывают результаты, накопленные нами в процессе работы с такими системами. Это является ценным свойством соответствующих сорбционно-аналитических систем для их использования в анализе.

PhDT представляет собой двухосновную слабую органическую кислоту ($pK_1 = 4.5$, $pK_2 = 6.5$). В водных растворах при $pH > 10$ PhDT существует преимущественно в анионной (дважды ионизированной) форме, которая практически не сорбируется PUF, а при увеличении кислотности растворов в отсутствие соли-билизаторов протонированные частицы реагента выпадают в осадок. Поэтому таблетки PUF пропитывали щелочным раствором PhDT с последующей обработкой 1 М HCl, а затем солью меди. Медь или ее ионы как макрокомпонент наиболее часто входят в состав различных объектов, включая технологические растворы переработки платиносодержащего сырья, поэтому осадок комплекса Cu(II) с PhDT использовали для импрегнирования PUF, учитывая ряд последовательности протекания реакций ионов металлов с PhDT [16].

Сорбционная емкость PUF по PhDT, Pd и Cu составила 60.1, 29.8, 31.0 мкмоль/г соответственно. Таким образом, молярное соотношение Pd или Cu к PhDT в фазе PUF равно 1:2. При этом возможно улучшение селективности извлечения Pd(II) с помощью полученного сорбента, благодаря образованию на поверхности носителя комплексов Pd(II) с такой же стехиометрией, что и осадок $\text{Cu}(\text{PhDT})_2$, и затруднениям в комплексообразовании других многовалентных ионов на фоне 5–6 М HCl.

Влияние кислотности на полноту протекания гетерофазной реакции замещения. Ионы Pd и Cu образуют комплексы с PhDT в широком интервале кислотности: от pH 4 до 5–6 М HCl (H_2SO_4). По результатам контроля содержания металла до и после контакта фаз в растворах HCl, H_2SO_4 и на фоне буферных смесей с различной величиной pH установлено, что ионы палладия в 3–6 М HCl при контакте с системой PUF–PhDT–Cu в течение 30 мин при комнатной температуре практически полностью ($R \geq 99.8\%$) вытесняют (элюируют) медь (рис. 1, кривая 1). При этом молярное соотношение сорбированного Pd(II) к элюированному Cu(II) составило 1 : 1.

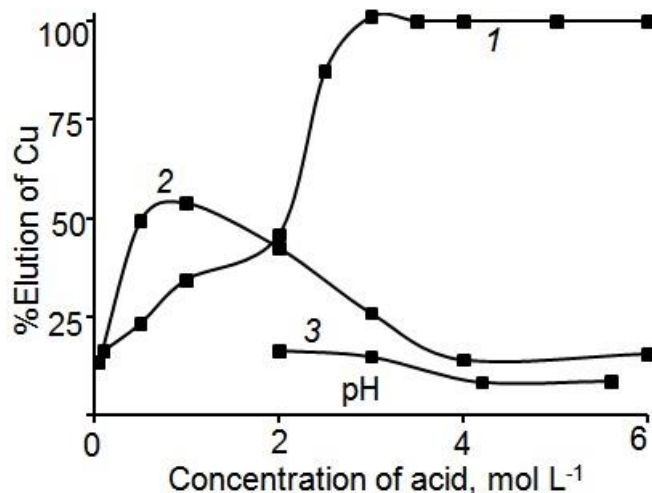
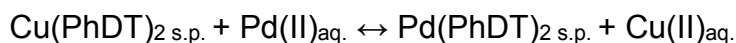


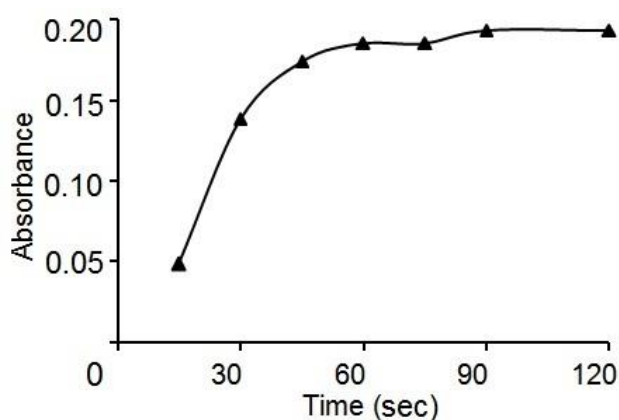
Рис. 1. Влияние концентрации HCl (1), H_2SO_4 (2) и величины pH (3) на степень элюирования Cu(II). Условия: 2×10^{-4} моль/л Pd(II), объем пробы 10 мл, время сорбции 30 мин; система PUF–PhDT–Cu, 30 ± 2 мг

Таким образом, гетерофазная реакция замещения протекает по уравнению:



На кривой 2 (рис. 1) присутствует плато в интервале 0.5–1 М H_2SO_4 , при этом стехиометрия реакции замещения также была 1:1, однако, в расворе определяли лишь 50% от общего содержания меди в фазе PUF. По-видимому, в этих условиях реализуется другой механизм твердофазной реакции, вероятно, с образованием разнометального комплекса. В последующих опытах создавали кислотность, отвечающую 5 М HCl .

Экстракция Cu(II) . Для комплексов меди с PhDT хорошими экстрагентами являются спирты (изоамиловый, бутиловый, гептиловый, гексиловый) и сложные эфиры (этил-, бутил- и амилацетат, трибутилфосфат). Несколько хуже экстрагируют кетоны (метилэтил-, бутилэтил-, диэтил-, метилгексил-, диизобутилкетоны. Предельные (гексан, гептан, нонан, декан), ароматические (бензол, толуол, ксилол) и хлорзамещенные углеводороды (хлороформ, четыреххлористый углерод) не экстрагируют комплексы меди. Наилучшими экстрагентами оказались изоамиловый спирт и амилацетат. Во всех последующих опытах применяли амилацетат. Эффективность этой процедуры зависит от количества экстрагента и времени контакта фаз. В водном растворе комплексы Cu(II) с PhDT образуются в интервале кислотности: от pH 4.2 до 6 М HCl . Установлено, что при соотношении водной и органической фаз 20:1 медь полностью ($R = 100\%$) извлекается из раствора с концентрацией 0.06 мкг/мл в 5 М HCl в случае 20–30-кратного массового избытка PhDT со временем контакта фаз 90–120 с (рис. 2). Следует отметить, что такие экстракционные параметры сохраняются вплоть до объема пробы 1000 мл. В последующих опытах при работе с 10 мл анализа объем экстрагента был минимизирован до 0.5 мл.



**Рис. 2. Влияние времени экстракции на аналитический сигнал Cu .
Условия экстракции: 0.06 мкг/мл Cu(II) в 10 мл 5 М HCl , 0.5 мл 0.1% PhDT в амилацетате**

Определение палладия косвенной FAAS. Один из специфических приемов концентрирования на PUF – метод пульсирующей колонки – заключается в том, что анализируемый раствор прокачивают через слой сорбента, находящийся в стеклянном или пластиковом медицинском шприце. Благодаря эластичности сорбента цилиндрическая пенополиуретановая вставка может быть легко сжата (или разжата) при движении поршня шприца. Метод пульсирующей колонки очень удобен для автоматизации процесса в режиме сорбция-десорбция [22]. Это обусловило выбор динамического режима концентрирования Pd(II) путем многократного пропускания (прокачивания) аналита через таблетку сорбента. В случае 10 мл раствора с содержанием 0.01 или 0.2 мкмоль Pd(II) в 5 М HCl равновесная концентрация Cu в водной фазе устанавливалась через 40 прокачек (рис. 3), что было принято за оптимальную величину, при этом степень извлечения Pd и элюирования Cu были практически равными и достигали 100%.

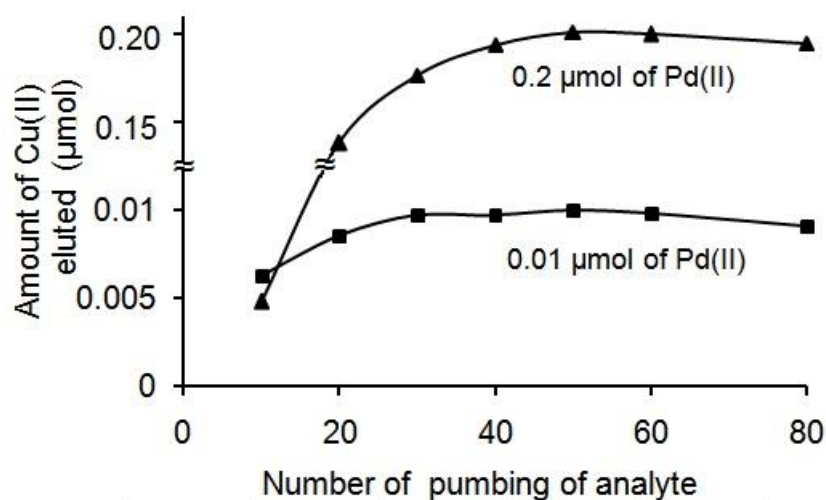


Рис. 3. Влияние числа прокачек 10 мл аналита через таблетку PUF-PhDT-Cu (10 мг) на количество элюированной меди

Для проверки правильности результатов косвенного измерения палладия по меди использовали метод «введено-найдено». Для этого в 10-мл шприц, содержащий таблетку сорбента массой 10 мг, вносили 10 мл раствора Pd(II) с концентрацией в интервале (0.05–2.1) мкг/мл в 5 М HCl, и проводили через все процедуры, включающие твердофазную экстракцию аналита с помощью PUF-PhDT-Cu, жидкофазную экстракцию выделившейся меди и ее реэкстракцию с последующим определением методом FAAS согласно описанных выше процедур. Как видно из табл. 1, для изученного интервала содержаний Pd в 10

мл пробы сохраняется молярное соотношение Pd:Cu = 1:1 в гетерофазной реакции замещения. Полученные результаты свидетельствуют об отсутствии значимой систематической погрешности ($s_r \leq 4\%$) и позволяют сделать вывод о возможности косвенного определения Pd по детектированию Cu методом FAAS.

Таблица 1

Результаты определения Cu методом FAAS после SPE Pd(II) системой PUF-PhDT-Cu (5 М HCl; $m(\text{PUF}) = 10 \pm 2$ мг; $n = 5$; $P = 0.95$)

Введено Pd (нмоль)	Найдено Cu (нмоль)	s_r (%)
10	10.05±0.37	3.0
20	19.85±0.62	2.5
50	49.02±1.46	2.4
100	99.04±2.71	2.2
197	197.10±5.88	2.4

Предложенный подход косвенной AAS может быть использован также и в случае методов ETAAS или GFAAS. Потенциально сохраняется возможность снижения предела обнаружения Pd, поскольку, например, с использованием системы AAnalyst 800 для палладия c_{\min} (мкг/л) составляет 30 (FAAS) и 0.09 (GFAAS), для меди 1.5 и 0.014 соответственно [23]. При детектировании меди, например, методом FAAS, выделенной в раствор путем заместительной реакции в фазе PUF, для палладия c_{\min} будет снижен в 12 раз, а в случае GFAAS – в 4 раза.

Мешающее влияние. В растворе процесс комплексообразования PhDT с многовалентными ионами протекает ступенчато и зависит от многих факторов: кислотности среды, природы заместителя в реагенте, скорости взаимодействия компонентов, избытка реагента, природы металла, посторонних ионов. При этом PhDT практически не вступает в реакции с ионами Zn(II), Fe(II, III), Al(III), Mn(II), Co(II), Ni(II), Cr(III,VI). Как и следовало ожидать, согласно ряду последовательности протекания реакции PhDT с катионами [16] наибольшее мешающее влияние на SPE Pd(II) в 5 М HCl оказывали ионы Au(III), Te(IV) и Se(IV). В этих условиях хлоридные комплексы Pt(IV) в наибольшей степени проявляют свою инертность

в координации с твердофазным реагентом [14], поэтому значительные избытки данного иона не влияли на SPE Pd(II). Установлено, что в условиях SPE 0.5 мкг/мл Pd(II) не оказывали мешающего влияния на протекание гетерофазной реакции замещения (мг/мл): до 2.5 – Fe(III), Cd(II), Zn(II), Mn(II), Al(III), Co(II), Cr(III); 1 – Ni(II), Co(II); 0.5 – Pb(II), Ag(I), Sb(III), Sn(IV), Bi(III), As(V), Tl(I), Ga(III), V(V), W(VI), Mo(VI), Rh(III); – Pt(IV).

В оптимальных условиях LLE извлекали 3.2 мкг Cu(II) с относительной погрешностью $\leq 2\%$ в присутствии значительных массовых избытков различных ионов (Me:Cu): 2×10^5 – Mg(II), Zn(II), Mn(II), Co(II), Ca(II) Al(III); 5×10^4 – Ni(II) Fe(III) Cr(III); 1×10^3 – Pb(II), Cd(II), Pt(IV); 10^2 – Ag(I).

Аналитическое применение. Результаты проведенного исследования были положены в основу разработки методики определения палладия в шахтной воде. Наличие тяжелых металлов в шахтных водах обусловлено их присутствием в подземных водах угленосных отложений и процессами, связанными с миграцией этих элементов из горных пород в шахтные воды. Для количественного определения палладия была отобрана проба воды из отстойника шахты «Краснолиманская» (Донбасс), которая содержала (мг/л): Pb – 0.30; Cu – 0.15; Cd – 0.08 (AAnalyst 200, воздух-ацетилен).

Методика. 100 мл отфильтрованной через фильтр «синяя лента» пробы помещают в узкий стакан емкостью 150 мл, приливают 0.5 мл HNO_3 ($\rho = 1.42$), 5 мл HCl ($\rho = 1.19$) и осторожно нагревают, не доводя до кипения, на электрической плитке до тех пор, пока объем не уменьшится до 5–7 мл. Охлаждают, осторожно приливают 1 мл 5 М HCl и затягивают аналит в 10-мл медицинский шприц. Промывают стакан 2 раза 5 М HCl порциями по 0.5 мл, затягивая промывные воды в шприц, и прокачивают аналит 40 раз через таблетку PUF ($m = 30$ мг), импрегнированную комплексом Cu с PhDT, в делительную воронку емкостью 10 мл. Промывают шприц и PUF 2 раза по 0.5 мл бидистиллированной водой, соединяя промывные воды с раствором аналита в делительной воронке. Добавляют 0.5 мл 0.2% PhDT в амилацетате и встряхивают смесь в течение 1 мин. Далее поступают с экстрактом согласно описанным процедурам, включающим реэкстракцию и определение меди методом FAAS с использованием градуировочного графика за вычетом фонового содержания данного металла.

Содержание меди в холостой пробе определяют в 100 мл воды, которую подкисляют 0.5 мл HNO_3 ($\rho = 1.42$), 5 мл HCl ($\rho = 1.19$) и осторожно упаривают

до 20 мл, после охлаждения фильтруют в мерную колбу емкостью 100 мл, промывают фильтр 2–3 раза бидистиллированной водой и доводят до метки. Полученный раствор вводят в спектрометр и определяют абсорбцию методом градуировочного графика, построенного по стандартным растворам меди с концентрацией 0.05–5 мкг/мл. Перед каждым измерением абсорбции вводят 0.2%-ный раствор HNO₃.

Содержание палладия в исходной пробе рассчитывают по формуле: $c(Pd) = \frac{c(Cu) \times M(Pd) \times V_{кон.}}{M(Cu) \times V_{пр.}}$, где $c(Pd)$ – концентрация Pd в исходной пробе, мкг/мл; $c(Cu)$ – концентрация Cu, найденная по градуировочному графику за вычетом фона, мкг/мл; $M(Pd)$ и $M(Cu)$ – молярные массы Pd и Cu соответственно, г-моль; $V_{пр.}$ и $V_{кон.}$ – исходный и конечный объем пробы соответственно, мл.

Результаты определения палладия комбинированным методом приведены в табл. 2.

Правильность разработанной методики определения палладия в пробе шахтной воды проверена методом GFAAS (Perkin Elmer AAS Model 4100ZL, Zeeman, AS 70) (табл. 2).

Таблица 2

**Результаты определения палладия (мкг/л) в шахтной воде
(n = 10, P = 0.95)**

Объект	Предложенный метод		GFAAC Прямое определение	
	$x \pm \Delta x$	$s_r, (\%)$	$x \pm \Delta x$	$s_r, (\%)$
Шахтная вода отстойника шахты № 1-3 «Краснолиманская», Донбасс (мг/л: Pb – 0.3, Cu – 0.15, Cd – 0.08):	7.52 ± 0.19	3.5	7.24 ± 0.10	1.9

Выводы

Представленные результаты показали эффективность концентрирования и определения Pd косвенной FAAS при сочетании твердофазного извлечения его ионов сорбентом на основе PUF, импрегнированного комплексами Cu с PhDT и размещенного в шприце, с экстракцией ионов Cu с помощью PhDT в амилаци-

тате. При этом минимизировано количество амилацетата до 0.5 мл. Предварительное упаривание (1 шаг концентрирования) 100 мл пробы перед ее помещением в шприц для прокачки через PUF и доведение резекстракта меди до конечного объема 5 мл (2 шаг концентрирования) позволяют в 240 раз снизить c_{min} палладия путем косвенного детектирования по меди. Разработанную чувствительную и селективную методику определения Pd в шахтной воде методом косвенной FAAS можно использовать в анализе различных типов воды, включая технологические растворы.

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Dexmedetomidine Ameliorates Histological and Neurological Outcomes after Transient Spinal Ischemia in Rats

ABSTRACT

Aims: Dexmedetomidine, an D₂ adrenergic agonist, provides neuroprotection in various cerebral ischemia models and against anesthesia-related neurotoxicity. Dexmedetomidine also improves paraplegia induced by intrathecal morphine after short-term spinal ischemia. In this preliminary study, we investigated whether dexmedetomidine provides spinal protection against transient spinal ischemia in rats.

Methodology: Adult male Sprague-Dawley rats were randomly divided into the following 3 groups: 1) intravenous infusion of 0.9% NaCl at a rate of 0.5 ml/h (control), 2) dexmedetomidine 1 µg/kg/h, and 3) intravenous infusion of 0.9% NaCl without spinal ischemia (sham). The rats received saline solution or dexmedetomidine 30 min before spinal cord ischemia and for 24 h. Spinal cord ischemia was induced by intra-aortic balloon occlusion combined with proximal arterial hypotension for 10 min. Ischemic injury was assessed by the neurological deficit score and by the number of viable motor nerve cells in the anterior spinal cord at 24 h of reperfusion.

Results: The neurological deficit score was significantly lower in the dexmedetomidine group compared to the control group ($p < 0.05$). The number of viable motor nerve cells in the dexmedetomidine group was significantly greater than was that in the control group ($p < 0.05$), but was lower than was that in the sham group.

Conclusion: Our findings suggest that continuous administration of dexmedetomidine ameliorates short-term neurological and histological outcomes induced by transient spinal cord ischemia and reperfusion in rats; thus, dexmedetomidine appears to protect the spinal as well as the brain.

Keywords: spinal protection; spinal ischemia; dexmedetomidine; D₂ adrenergic agonist.

1. INTRODUCTION

Dexmedetomidine, an D₂ adrenergic agonist, has been widely used clinically as an adjuvant of anesthesia and in intensive care because it has sedative and analgesic effects [1,2]. Dexmedetomidine has also been shown to have a protective effect on the brain in various ischemia models, such as focal [3-5], global [6-8], and incomplete cerebral ischemia [9-11]. Previous studies suggested the following mechanisms for these neuroprotective effects: decreased activation of focal adhesion [12], imidazoline 1 receptor-extracellular-regulated kinase pathways [12,13], activation of protein kinase C [14], anti-oxidant effect [7,15], excitatory neurotransmitter suppression [10,16], anti-inflammatory effect [7], and anti-apoptotic effect [7,11,17].

Transient spinal ischemia can occur under various conditions during surgery, especially thoracic aortic surgery, and spinal ischemia can induce detrimental paraplegia in some circumstances. Pharmacological adjuncts need to reduce and prevent the incidence of paraplegia following spinal cord ischemia. Based on the previous reports that dexmedetomidine prevented morphine-induced paraplegia following short-term transient spinal ischemia [18] and reduced spinal cord ischemia-reperfusion injury in mice [19], administration of dexmedetomidine would affect spinal cord injury caused ischemic insult as well as brain protective effects. Thus, the aim of this preliminary study was to evaluate the neuroprotective effect of dexmedetomidine on spinal cord ischemia and reperfusion injury in rats.

2. MATERIALS AND METHODS

2.1 Preparation of Rats

Male Sprague Dawley rats weighing 350 to 450 g were used in this study. The rats had free access to food and tap water before the experiment. None of the animals had any neurological abnormality before anesthesia and surgery. On the day of surgical preparation, the rats were weighed and were administered a continuous flow of 4% halothane and 60% nitrous oxide in oxygen in an acrylic plastic box. Anesthesia was maintained with 0.75% to 1.5% halothane with 30% oxygen with a non-sealing facemask device. The rectal and paravertebral muscle

temperatures were maintained at approximately 37.0°C with a heating lamp and an underbody heating pad. Surgical preparation was conducted as previously described [20]. The femoral vein was cannulated with a PE-50 catheter to infuse dexmedetomidine or saline. The catheter was tunneled subcutaneously and was exteriorized through a swivel sutured over the dorsal mid-thorax, which allowed the rat to move freely in the cage after emergence from anesthesia. The tail artery was cannulated with a PE-50 catheter for monitoring the distal arterial pressure (DAP). A PE-60 catheter was inserted into the right carotid artery for monitoring the proximal arterial pressure (PAP), and the catheter was connected to an external blood reservoir to reduce the mean PAP during aortic occlusion to 40 mm Hg. Spinal ischemia was induced by a balloon catheter via the femoral artery, as previously described [20,21]. Briefly, the right femoral artery was exposed and a Fogarty 2F balloon-tipped catheter (Edwards life sciences, Irvine, CA) was advanced into the thoracic descending aorta (11 cm from the site of insertion). Immediately after performing arterial cannulation, 200 U of heparin (0.2 ml) was injected into the tail artery. The catheter balloon was inflated with 0.05 ml saline and was maintained for 10 minutes. The efficiency of the occlusion was confirmed by a decrease in the DAP measured at the tail artery. The PAP was decreased to 40 mm Hg during occlusion by drawing blood from the carotid artery containing 1 ml of 7% sodium bicarbonate solution. The balloon was deflated after ischemia, and the collected blood was administered to the animals through the carotid artery catheter within 2 min. The rats were brought out of the anesthesia 30 min after reperfusion. The animals were returned to the cage if their hemodynamic variables were stable after all catheters, except for the femoral vein catheter, were removed. The incisions were subsequently closed.

2.2 Groups

The rats were randomly divided into 3 groups as follows: 0.9% NaCl solution (control group; n = 8), dexmedetomidine at a rate of 1 µg/kg/h (dex group; n = 8), and the sham surgical group (n = 6). The drug-infusion or saline-infusion volume was adjusted to a rate of 0.5 ml/h and was administered from 30 min before aortic occlusion until the end of the subsequent 24 h reperfusion. The rats in the sham surgical group received saline through catheters that were inserted in the same manner, without the induction of spinal cord ischemia.

2.3 Measurements

2.3.1 Hemodynamics

Hemodynamic variables (PAP, DAP, and heart rate) were continuously monitored and were recorded after surgical preparation for up to 5 minutes after reperfusion. Arterial blood gas and blood glucose levels were determined immediately before aortic occlusion and 5 min after reperfusion.

2.3.2 Neurological evaluation

At 24 h after reperfusion, the neurological deficit score (NDS) of the animals was assessed according to previously described grading systems [20]. The NDS was quantified as shown in Table 1. The NDS was calculated for each rat as the sum of the ambulation, placing/stepping reflex scores and sensory score; the maximal score was 8. The assessments were made by a blinded observer (YT).

2.3.3 Histological evaluation

After scoring neurological function at 24 h, the animals were anesthetized with 4% halothane in an acrylic plastic box. A high dose of pentobarbital (80 mg/kg) was administered by intraperitoneal injection. After the administration of a direct left ventricular bolus of 0.2 ml heparin, each rat was transcardially perfused with 100 ml heparinized saline followed by 150 ml of 4% paraformaldehyde in phosphate buffer (pH 7.4). The lumbar spinal cord was removed and was post-fixed in the same fixative for another 48 h. Post-fixation, the L4 spinal segment was dissected and was embedded in paraffin; subsequently, serial transverse sections of 3 μ m thickness were prepared. The slides were stained with hematoxylin and eosin for quantitative evaluation. Analysis of the degree of ischemic cell injury was based on the number of viable neurons in the ventral area of the gray matter (anterior to a transverse line drawn through the central canal) with x 100 magnification in each group. Intact cells that contained Nissl substance in the cytoplasm, loose chromatin, and prominent nucleoli were considered viable neurons. The assessments were made by a blinded observer (YT).

Table 1. Neurological deficit score

Motor and sensory function		Score
Ambulation	Normal	0
	toes flat beneath the body when walking but presence of ataxia toes	1
	knuckle walking	2
	unable to knuckle walk but some movement of the lower extremities	3
	no movement of the lower extremities	4
Placing/stepping reflex	Normal	0
	weak	1
	no stepping	2
Sensory	Normal	0
	weak	1
	none	2

2.4 Statistical Analyses

The physiological variables and the number of normal ventral cells are expressed as the mean \pm SD. Comparisons among groups were made with 1-way analysis of variance for multiple comparisons followed by a Bonferroni post-hoc test. The NDS data for the animals are expressed as the median with the range in parentheses. The differences were determined by nonparametric analysis using the Kruskal-Wallis test. P values < 0.05 were considered statistically significant.

3. RESULTS AND DISCUSSION

The physiological variables and arterial blood gas data are presented in Table 2. No differences were found between the experimental groups with respect to the proximal MBP, Distal MBP, heart rate, and paravertebral muscle temperature before and after ischemia. Proximal and distal MBP in the saline group after ischemia were higher than that before ischemia. The blood chemistry values before aortic occlusion were within the normal range, with no significant differences between the groups. The blood glucose and pH levels after reperfusion were significantly higher and lower, respectively, compared to those before ischemia and sham group ($p < 0.05$).

As shown in Fig. 1, the medians (range) of the NDS were significantly lower in the DEX groups compared to the control group ($p < 0.05$).

Table 2. Physiological variables 10 min before, during and after ischemia

	Before ischemia				During ischemia				After ischemia			
	Sham (n=6)	Control (n=8)	Dex (n=8)	Sham (n=6)	Control (n=8)	Dex (n=8)	Sham (n=6)	Control (n=8)	Dex (n=8)	Sham (n=6)	Control (n=8)	Dex (n=8)
Proximal MBP (mm Hg)	89±11	77±9	81±11	99±9	42±4*#	41±2*#	97±9	111±17*	91±12	97±9	111±17*	91±12
Distal MBP (mmHg)	84±11	72±10	79±10	97±10	7±3*#	6±1*#	99±10	109±20*	89±14	99±10	109±20*	89±14
Heart Rate (bpm)	367±27	335±28	339±18	363±19	256±94#	310±21#	371±18	320±32	347±12	371±18	320±32	347±12
Paravertebral temperature (°C)	37.9±0.3	37.9±0.2	37.7±0.2	38.0±0.3	38.0±0.3	37.7±0.1	37.9±0.2	37.8±0.2	37.9±0.1	37.9±0.2	37.8±0.2	37.9±0.1
pH	7.43±0.02	7.412±0.05	7.339±0.06				7.433±0.01	7.314±0.04*	7.282±0.02*#	7.433±0.01	7.314±0.04*	7.282±0.02*#
PaO ₂ (mmHg)	141±19	123±23	107±23				136±11	135±19	114±14	136±11	135±19	114±14
PaCO ₂ (mmHg)	43±2	42±3	54±9				43±2	49±4	57±5#	43±2	49±4	57±5#
Blood glucose (mg/dl)	110±13	110±20	121±26				108±15	222±18*#	197±56*#	108±15	222±18*#	197±56*#
Hb (g/dl)	14.7±0.8	14.6±1.0	14.5±0.7				14.6±0.3	14.5±0.8	13.9±0.7	14.6±0.3	14.5±0.8	13.9±0.7

Data are expressed as mean ± SD. MBP = mean arterial blood pressure. DEX = dexmedetomidine. * p<0.05 vs before ischemia in the group. # p<0.05 vs sham group

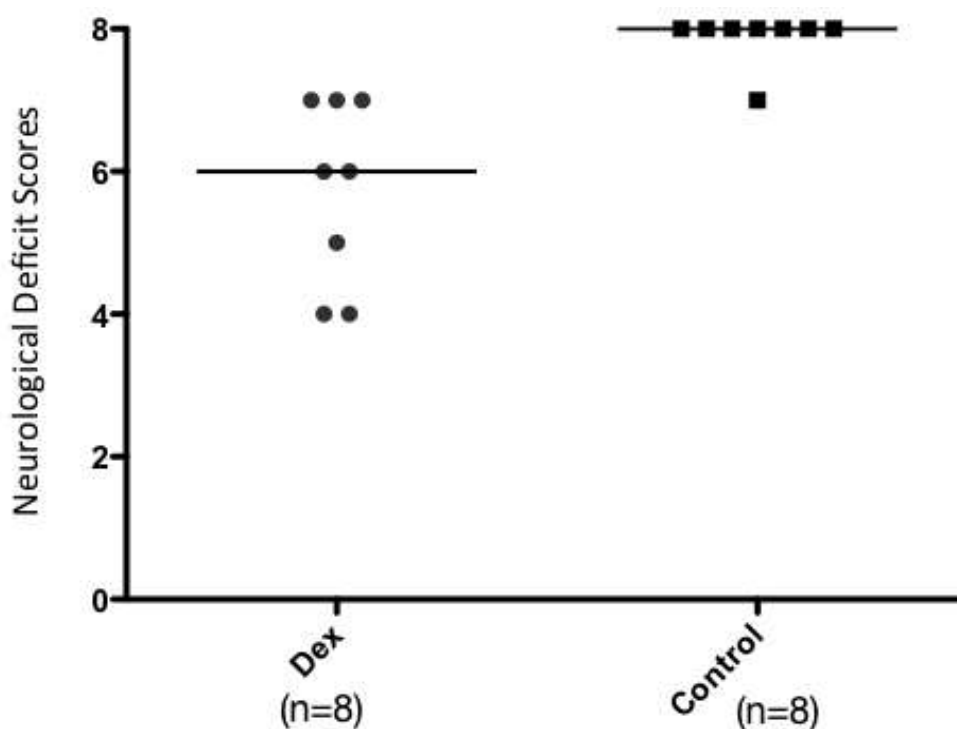


Fig. 1. Neurological deficit score (NOS) 24 hours after transient spinal ischemia in rats

The median value was significantly lower in the dex group compared to that in the control group at 24 hours after ischemia. The score in the sham group was zero. dex = dexmedetomidine

Representative photomicrographs of the ventral area of hematoxyline and eosin-stained transverse sections taken from the L4 spinal segment are shown in Fig. 2. The number of viable motor nerve cells in the ventral area of the gray matter in the dexmedetomidine group (39.2 ± 6.5) was significantly greater than was that in the control group (20.2 ± 12 , $p < 0.05$), but was lower than was that in the sham group (58 ± 6 , $p < 0.05$).

This preliminary study showed that dexmedetomidine improved the neurological and histological outcomes after 24 h of transient spinal ischemia and reperfusion. These findings are consistent with a previous report demonstrating that dexmedetomidine provided neuroprotection against brain ischemia [3-11].

Many previous reports regarding the neuroprotective effects of dexmedetomidine focused on its ability to protect the brain against various insults such as transient focal [3-5], forebrain [6-8], and incomplete ischemia [9-11], anesthesia-related neurotoxicity [22,23], and various other conditions [15,24,25]. Although there were many studies which referred the drug-induced spinal protection against spinal cord ischemia for example beta-blocker [20], statin [26], and rolipram [27], few

studies that dexmedetomidine prevented morphine-induced paraplegia following short-term transient spinal ischemia [18] and reduced spinal cord ischemia-reperfusion injury in mice [19], existed.

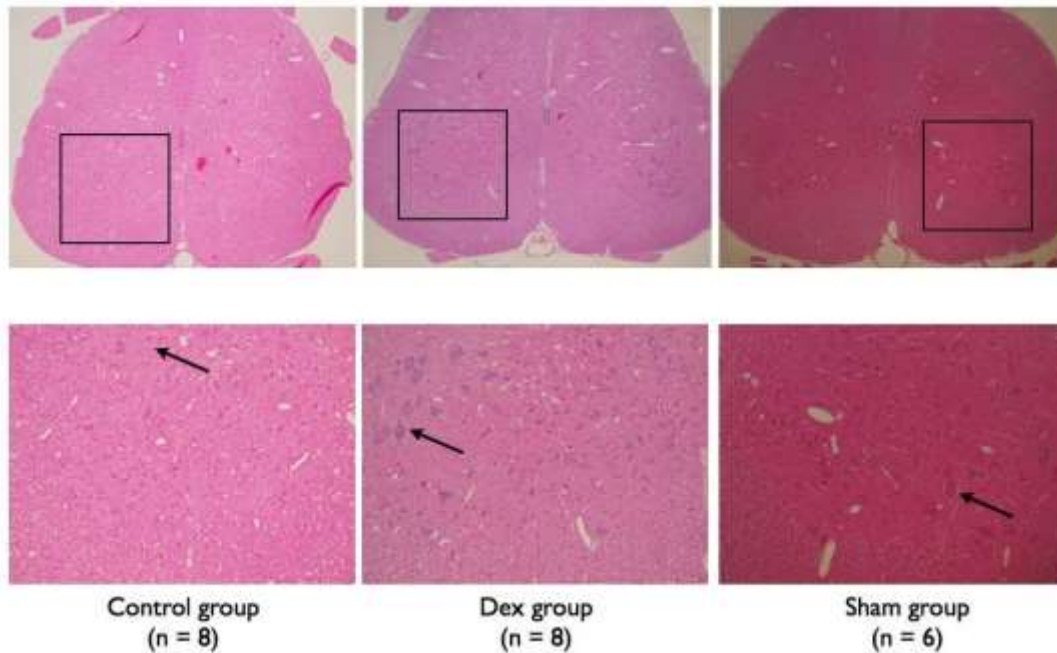


Fig. 2. Representative photomicrographs (x40; upper figures, x100; lower figures) of the ventral area of hematoxyline and eosin-stained transverse section 24 hours after transient spinal ischemia

Arrows indicated viable motor nerve cells

In this study, only short-term results (i.e., 24 hours) were assessed. A previous study showed that transient spinal cord ischemia-induced motor dysfunction deteriorated into paraplegia for several days [28]. Neural degeneration was shown to progress gradually after an ischemic insult, with the number of necrotic neurons peaking at 2 days after the insult [29]. Moreover, hind-limb motor function might gradually recover during the 2 weeks following spinal cord ischemia [29]. Therefore, a further study that includes long-term observation is needed.

We did not examine the mechanisms of dexmedetomidine-induced spinal protection in this study. Many previous studies demonstrated the protective effects of dexmedetomidine on the brain against transient focal ischemia [3-5], transient forebrain ischemia [6-8], and incomplete brain ischemia [9-11]. Further, numerous reports have proposed mechanisms for the neuroprotective effects of dexmedetomidine, including decreased activation of focal adhesion [12], imidazoline 1 receptor-extracellular-regulated kinase pathways [12,13], activation of protein kinase C [14],

anti-oxidant effect [7,15], excitatory neurotransmitter suppression [10,16], anti-inflammatory effect [7], and anti-apoptotic effect [7,11,17]. Therefore, we can only speculate on the mechanisms responsible for the protective effects of dexmedetomidine against transient spinal ischemia.

Although we did not evaluate the mechanisms or the long-term effects of dexmedetomidine against transient spinal cord ischemia, the results from this preliminary study suggest that dexmedetomidine exerts short-term protective effects against spinal cord ischemia-reperfusion injury. Further studies are warranted to investigate the detailed action, mechanisms, and therapeutic time window of dexmedetomidine-induced spinal protection.

4. CONCLUSION

In summary, we investigated the effect of pre-administered dexmedetomidine after transient spinal cord ischemia in rats by performing neurological and histological evaluations. Dexmedetomidine improved the short-term neurological and histological outcomes, suggesting that dexmedetomidine exerts protective effects on the spinalcord as well as on the brain.

CONSENT

Not applicable.

ETHICAL APPROVAL

All authors hereby declare “Principles of laboratory animal care“ (NIH publication No. 85-23, revised 1985) were followed, as well as specific national laws where applicable. All experiments have been examined and approved by the Animal Subjects Committee of Akita University Graduate School of Medicine.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Australian Journal of Education and Science

No.1. (17), January - June, 2016

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