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**COGNITIVE MARKETING RESEARCH ON BIOFEEDBACK
BASIS FOR ENHANCING STUDENTS' SKILLS**

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Abstract

The article examines the issues of the cognitive approach to marketing activities for academics, educational practitioners and marketers. Considered within the framework of cognitive marketing at the university, emerging research techniques include the biofeedback which enables to define audience's attention, students' engagement, evaluate the efficiency of teaching materials, and offers a more thorough understanding of the learning process. On the basis of non-linear marketing research, it is possible to rethink traditional marketing approaches and to provide useful developmental threads for tailoring other elements of the marketing mix, such as the educational process, people and physical environment at the university. The present paper identifies opportunities and challenges of the non-linear cognitive marketing research application for educational purposes. Several studies on biofeedback basis were carried out so that to find the influence of an educator, of active learning methods and the educational material presentation on the students' mental state. The CMS (Current Mental State) technique in the form of a hardware-software biofeedback complex was utilized to obtain an unbiased evaluation of the students' emotional and mental state and well-being. The result of this quantitative research was a set of parameters displaying the current mental state of the participants and showing the students' reaction to the learning material and environment. The practical significance of the CMS study is to broaden marketing research scope for educational purposes and to equip educational practitioners and marketers with the better insight in the issues of cognitive marketing activities at the university.

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Keywords: Cognitive marketing, biofeedback, CMS (Current Mental State).



1. Introduction

The emergence of broad interdisciplinary knowledge and the new paths of science within the rapid expansion of technologies have a significant impact on the evolution of marketing theory (Yuldasheva, 2015; Krushanov, 2001). The formation of educational marketing concept in the twentieth century was primarily due to the promotion complex, advertising and PR activities of the universities, active formation of their competitive positions on national and global market of educational products (if university is seen as institution that provides training services), and traditional marketing research. The institutional and socio-cultural environment with high competition and technological progress required the evolution of the management of a university, the scope of educational marketing challenges has expanded significantly (Pokrovskaia, 2014).

All the elements of marketing mix of a modern university require constant updating and improvement (Ababkova & Leontieva, 2018) – from the product (curriculum and educational program design, professors and professionals' contribution) and the educational environment (classroom equipment, lecture halls, etc.) as an important part of educational marketing, to the communication and promotion (university web-site, social media presence, public relations, event management). Ten or twenty years ago the functional spheres of educational marketing were the "typical" marketing issues (marketing planning, analysis and adaptation to the market, implementation of the marketing strategy, selection of target segments, advertising campaign, etc.). Currently, when the methodology of educational marketing activities has been formed in general, the adaptation and development of marketing technologies based on interdisciplinary research within the framework of holistic marketing, are of great importance and requires an integrated approach.

Holistic marketing approach in education outlines several functional areas of marketing, covering the multifaceted activities of modern educational organizations. "A holistic marketing concept is based on the development, design and implementation of marketing programs, processes and activities that recognize the breadth and interdependencies" (Kotler, 2009, p. 30). Holistic marketing proceeds from the fact that everything is related to marketing, and its success often requires a broad and integrated point of view. It is necessary to balance the various competencies and complexities of the up-to-date marketing activities based on the needs of customers, partners, employees of the organization and society. A comprehensive holistic approach to education marketing is based on the fact that all marketing programs and activities are developed on the basis of the principle of their interdependence.

Marketing integration of economics, sociology, psychology on the basis of the cognitive theory and methodology of marketing allows marketers to improve the methodology of research. The starting point for the formation of a new marketing paradigm is the success of cognitive psychology (Neisser, 1967), which studies the relationship of mental processes and behavior models (Chomsky, 1959). The cognitive approach in marketing is based on the study of consumer behavior, its cognitive processes and thinking that determines the features of decision-making in the market (Fursov & Lazareva, 2015).

Identification of future needs, formation of technologies and standards of consumption on the basis of taking into account the specifics of the cognitive processes of the consumer allows to update and improve the tools of the marketing complex of the educational organization. Cognitive marketing in education is implemented in the form of proactive interaction with target audiences, foresight and

research to influence the thinking, perception, basic cognitive processes of the students (Burova, & Pokrovskaya, 2014).

The goal of cognitive marketing is to focus on the client, research and analysis of emotional needs, and personalization within the learning process to hone and update the design of the main marketing tools.

2. Problem Statement

The sphere of higher education, both in Russia and abroad, in recent years has become more competitive than ever before due to several educational trends. The first trend implies the further globalization of education (Terebkova & Pokrovskaya, 2015), exponential expansion of educators' and students' mobility options and the onward increase of the international students' number all over the world. The second trend emerges as "student-centered" education (Razinkina et al., 2018), based on educational material honing to fit in the learners' requirements. The third trend is the high-tech and network pedagogy built on the online education, neuroeducation and cognitive psychology ("pedagogy of NeuroWeb") (Ababkova & Pokrovskaya, 2016).

Thus, frameworks for marketing activities at the modern university need to be expanded in order to find new solutions to the pressing issues of education (Trostinskaia, Safonova & Pokrovskaya, 2017, p. 29-32). It takes the involvement and combination of multifaceted knowledge, methods, and technologies of two or more academic disciplines in marketing research activities. One of the so-called "hybrid" areas of research is the relatively new phenomenon of the non-linear marketing research application for educational purposes. The basic concept of consumer behaviour within a linear notion of marketing activities in the area of higher education, is expressed in various stages of traditional marketing practice. It includes certain steps in the selling process, the hierarchy of effects, advertising and branding goals etc.

Confronted by change and technological advancement, universities appeal to all elements of the marketing to improve the impact on the consumer behaviour with a competitive advantage, to attract students and their families as the most frequent buyers on the market of educational product. This product includes the most important substantial characteristics of a higher education program, such as curriculum, specialist competences design, inter-connection of disciplines, internships and practical works included into the course, people involved into teaching and roles of universities' professors and of professionals as representatives of the real business (and potential employers), who present both theoretical and practical knowledge and skills to students, etc. The educational environment plays its role of the infrastructure that makes comfortable the learning process, including the equipment, classes, hardware and software, etc. All the components of an educational marketing mix require constant updating in the light of modern practices, taking into account the trends of globalization (e.g., English-speaking lectures and seminars), professionalizing (master-classes and workshops of professionals of industrial companies) and high technologies (visits in labs, e.g. the super-computer laboratory of St-Petersburg Polytechnic University; the different kinds of the social media, texts or presentations-making options through the clouds and shared documents, etc.). The organisation of teaching process includes not only the physical infrastructure, the area and geography of the university campus, but also a comfortable, rational and flexible schedule and time management. The university governance and administration, quality of the

classroom work, the professor attitudes provide comparative advantage in the education market and need to be explored and revised.

Nowadays, the education engineering and marketing practitioners are interested in the applicability of the alternative qualitative and quantitative methods, using a non-conventional approach and nonverbal techniques for educational purposes. The educational process considered as a marketing mix tool can also be characterized by intensive, intellectual, emotional and physical participation of the students and their involvement into the interaction and activity of knowledge assimilation due to different learning methods and techniques. Continuous improvement of the educational process aimed to fit in the learners' requirements and to gain constant feedback from the students can also be rendered by the new methods and techniques of marketing research in education (Evseeva, Obukhova, & Tanova, 2017). Such approach as biofeedback techniques to provide direct improvements both for the learners and educators, are widely used by both academics and practitioners nowadays. A broad spectrum of research areas such as the consumers' emotional attachment and attitudes towards the higher education brand, measuring the student's engagement are of interest for the modern educators.

3. Research Questions

The cognition is a complex process and it is to be studied for education purposes as well as for marketing ones. The search and assimilation of new information are intended to improve both – the consumption (to make better choice) and the professional activity (to improve skills and competences to better employment or business results) (Gridneva, Petrov, & Pokrovskaya, 2018, pp. 28-31). This common point helps to apply the marketing methods into educational process with both aims – to attract new clients, students and their families, and to improve the result of knowledge consumption, the quality of the human capital produced by the University, that will produce a cyclic impact on the University brand to attract new students.

The cognitive process of learning as a process of knowledge consumption represents several points that require comprehensive research. The involvement and implication of students into the studying at university are enrooted in the complex set of personal motivation, group dynamics, social and socio-cultural regulation as value and norms system. One of the dramatic issues is to foster and maintain the motivation to learning at all moments of the educational program.

For the moment, traditional (full-time) and distance (remote, virtual) learning coexists (Almazova, Andreeva, & Khalyapina, 2018, pp. 162–174), but there is still no adequate model of distance learning, which supports the motivation and self-organization of online students (Bylieva, Lobatyuk, & Rubtsova, 2018). For example, according to the internal statistics of the Study Department of the Institute of Humanities of Peter the Great St-Petersburg Polytechnic University at the end of the winter session 2018/2019 52% of the 3rd year students had problems with distance learning courses, and only 28% faced difficulties in passing the traditional courses. Since cognitive marketing is aimed at improving the standards of interaction with the consumer, it is reasonably to ask whether the psycho-physiological state of students differs much in the perception of the educational material presented by an educator from the perception of the same material through distance learning and how to improve this interaction.

Another research gap concerns the understanding of the impact of the new information on the reality of thinking, that represents the typical problem for promotion and marketing communication, when the effectiveness of an advertising or public relation' event is to be measured with both elements – the assessment of reputation improvement (communicative effectiveness) and with the real behaviour change, the action of purchase (the demand increase for the services of the concrete educational institution, that determine the economic efficiency). The increase and enhancement of the reality and pragmatism of the students' behaviour should also be measured as a criterion of the assessment of educational process.

4. Purpose of the Study

Modern neuron technologies, including biofeedback, when a person becomes aware of the body's physiological functions, are increasingly involved into education nowadays. From one side, receiving feedback on heart rate, skin temperature, brainwave activity, blood pressure, respiration, and muscle activity a person learns to modify physiological activity to improve health and performance (de Bruin, van der Zwan, & Bögels, 2016, p. 1183; Peper, 1979, p. 111). From another side, biofeedback can provide the educational practitioners with new insights about how to design the teaching materials and handouts and foster creativity in the classroom, especially with the international students adapting to the new environment. Accurate real-time feedback can also provide a strong framework on continuous development for the educational practitioners.

The study based on the biofeedback technique was applied in the form of the Current Mental State complex for the objective assessment of the emotional involvement of the students during their classroom work. The research objective was to provide data on the psycho-physiological state of two groups of the students in the perception of educational material. The tasks of the study were as follows:

- Preliminary biofeedback evaluation of the psycho-physiological state of the before the classwork.
- Final biofeedback evaluation of the students after the classwork.
- Comparing the obtained data for the experimental and the reference groups and forming the conclusions.

A hypothesis for the research was the assumption that classroom learning with an educator has a positive effect on the emotional sphere of the students with higher level of assimilation and practical involvement than the study of similar material through the distance learning.

5. Research Methods

For the experiment, two focus groups of the students were formed, equal in the number, similar in the age and sex. Besides, the participants had similar distribution in psychological parameters estimated with the help of a questionnaire to measure such psychological features as neuropsychological instability, extraversion and psychoticism. The experiment for the control group (1) included an “ordinary” lecture with physical presence of a teacher and interaction between students and professor. The experimental group (2) was given a classroom work with studying a computer material.

Collecting the data on the emotional state of students was based on psycho-physiological methods of CMS (Current Mental State) implemented in the form of a hardware-software complex. This method enables researchers to objectively evaluate the psychological state by the data from cardiorythmography, as well as monitor the changes in the state during various time periods and gauge the effect of various influences (Piskun, Ababkova & Leontyeva, 2018, p. 45-47). The hardware-software complex includes a microcardioanalyzer and CMS software (fig. 01).

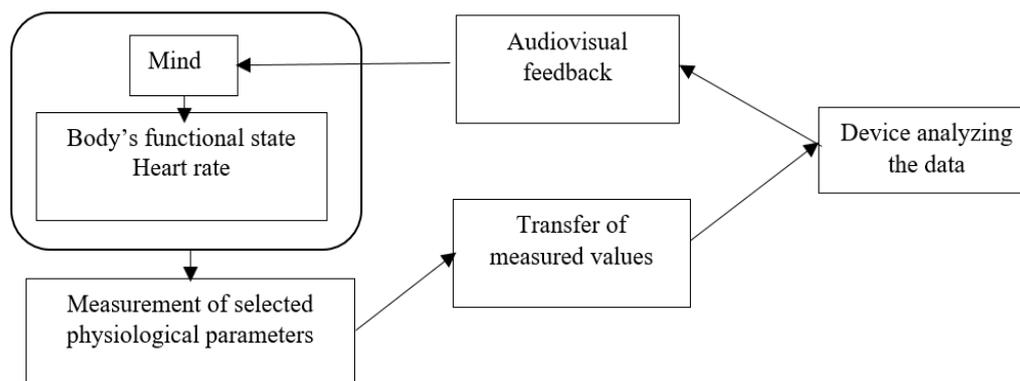


Figure 01. Schematic representation of the biofeedback method

The results of the research are quantitative (in per cent) values for parameters of the current psychological state of the students (in 19 scales) before and after the experiment representing the degree of the feature of the current psychological state. In these scales (in per cent) the similarity or difference is determined between the state of the examined person and the reference samples.

6. Findings

The research results showed that the indicators of psychological and physical state of the students' health and mental state highly depend on the form of learning process. For example, the indicators of the emotional sphere of the students differ during distance learning and interaction with an educator; there can be an increase in the intensity of emotion, as well as a decrease in vigour in the form of some tendency towards seriousness and apprehension with generally high level of the positive attitude. However, the indicators of mania are decreased and the balance "Myself-Others" is improved during the the perception of the educational material presented by the educator (table 01).

Table 01. Summary of the experiment results (abridged)

Experiment	Affecti-vity, emotions' intensity	Intensity of psycholo-gical reaction	Pragmatism, reality of thinking	Neuroticism, risk of actual psycho-traumatizing emotions	Emotional intempe-rance, balance "Myself-Others"	Mania, current excitement
Control group, pretest	14,83	13,55	16,11	7,16	5,38	12,44
Control group, posttest	16,94	7,72	10,66	7,94	2,58	5,52
Experimental group, pretest	14,69	14,53	16,38	8,30	6,62	12,67

Experimental group, posttest	17,61	12,15	3,46	11,69	3,34	6,45
Reference value	4,8	7,6	6,3	8,1	1	1,1

Various forms of learning process can cause anxiety and increased apprehension, and the distance learning contributes the least to this effect. It is noteworthy that the indicators of a degree of the current spontaneity's limitation and productivity of mind are improved during the distance learning, whereas the indicators characterizing the risk of presence of actual psycho-traumatizing emotions, as well as a slight limitation of vulnerability and higher sensitivity are deteriorated. As the experiment result showed, the distance learning deteriorates the values of specificity (pragmatism and reality) of thinking, as well as the reality, accuracy and faultless of the opinion. When studying with an educator, the indicators of the degree in expressiveness of repeated (obsessive) emotions are improved.

Basing on our experiment, we can draw the conclusion that working with new educational materials always increases the stress, disregarding of the presentation form of that material. Obviously, in order to achieve the optimal results of the learning process, it is necessary to alternate the learning course between self-studying (distance learning) and educational material presented by an educator; distance learning cannot be considered as an alternative to the learning powered by an educator.

The final assessment of the current mental state, taking into account the values of all scales in the control group before the experiment was 3.18, after the experiment 3.62, which corresponds to a slight deviation from the standard norm. In the experimental group, the final score on the results of pretesting was 3.45, with post-testing of 3.23, which corresponds to the population norm. The final result of the experimental group is better than the same result of the control group.

Thus, as a result of the experiment in the control group an improved indicator was the balance of mental reactions "Myself-Others"). In the experimental group the indicators of affectivity and state of excitement, mania also improved. The hypothesis of the study was partially confirmed.

As the results of the research show, distance learning facilitates emotional tranquillity, mobility, mental processes, strengthen the mental and syndromic adaptability, relieves anxiety.

The guidance of an educator also helps to strengthen the reserve of syndromological adaptability, increases the level of mobility of mental processes, improves the balance of mental reactions "Myself-Others". It is obvious that in learning process it is necessary to combine both types of work. The combination of different forms and models of learning process, in which an educator participates, but does not play a decisive role, improves the emotional state of students.

7. Conclusion

The application of the CMS technique for objective assessment of the personality traits on the basis of software-hardware complex contributes to estimating the level of psychological comfort to the learning environment. Monitoring the students' adaptation to studying can help to cope with difficulties in emotional and communicative sphere within a continuous process of psychological adaptation to constantly changing external conditions. Further investigations using the biological feedback technique can help answer the important questions about students' emotional state and involvement; about the

optimal time-schedule of classes, alternating between “active” and “passive” hours (for example, between physical training and lectures); about the time required for restoration (relaxation) after difficult classes and exams. Plans for further experiments include studying the role of the educator in influencing the psycho-physiological state of students. In general, the results of the experiments allow to conclude that using the biological feedback method is efficient from the viewpoint of obtaining the actual data on the current psychological state of students to hone the parameters of the learning process.

The evolution of the cognitive educational marketing concept is a new paradigm that helps to increase the competitive potential of the educational organization. It based on the study of cognitive processes occurring in the minds of the consumer and allows to interpret consumer behaviour and create effective learning strategies. The implementation of this concept consists in the creative aspect, when the educational organization actively forms the standards and technologies of consumption of its educational products, taking into account the emotional component of consumer behaviour.

The adaptive concept of cognitive marketing takes into account the existing needs and lifestyle of consumers in its programs. The new paradigm of marketing education focuses on the study of cognitive processes of individuals, especially the perception of consumers, the formation of so-called cognitive maps.

Educational marketing methodology can be expanded by cognitive and non-verbal research methods, such as biological feedback. The utilization of cognitive research within the framework of educational marketing through interdisciplinary cooperation will be in demand by the education of the future as tool for the implementation of the educational process and evaluation of its effectiveness.

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