

COMPETENCE-COMMUNICATIVE APPROACH TO IMPLEMENTATION OF APPLIED MATHEMATICAL PREPARATION OF THE FUTURE BACHELOR OF ECONOMY

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Abstract

The article considers the possibility of implementing applied mathematical training of the future bachelor of economics on the basis of a competent and communicative approach. The need to develop the communicative competence of the future economist, demanded in conditions of complication of social and economic relations, is justified. In these conditions the demand of professional activity in the conditions of cooperation, increases in cooperation, skills of the developed dialogue communication between participants of scientific and professional community. Related to this is the relevance of the topic of this article. Special attention is paid to the evolution of the communicative competence of the future economist in the conditions of digitalization of the economy and economic research. Creating didactic conditions for students to successfully learn the economic bachelor of communicative norms and options of communicative behavior in various educational and professional situations requires increased attention from teachers of higher economic school, methodologists, psychologists and teachers-researchers. The content of applied mathematical training is presented, elements of which are economic-mathematical models and methods. Three educational areas were analysed: «Risk Theory», «Econometrics», «Decision Theory». The potential of applied mathematical training of the future Bachelor of Economics for increasing communicative activity of students, mastering mechanisms of design and interpretation of communicative actions has been revealed. Also in the context of professional training of the future Bachelor of Economics at the Economic University, the link between communicative competence and opportunities of intellectual entrepreneurship and activity cooperation is pointed out. From a didactic point of view, the communicative component of the applied mathematical problem of socio-economic content is considered as a special educational situation arising independently in the process of its solution or organized by the teacher. This situation requires interaction of the participants of the educational process to build and study the corresponding economic and mathematical model, selection of the method of intra-model research, selection of the tool and meaningful interpretation of the obtained results in socio-economic terms. Designing the development of communication competence of future bachelor's degrees of economics requires an optimal combination of traditional and learning technologies, oriented to the formation of a new type of communication among students - in a digital educational and professional environment. Realization of competency-communicative approach to applied mathematical training of the future bachelor of economics promotes formation of competences in the field of search, critical analysis and synthesis of professional-significant information, application of system approach for tasks of future professional activity on the basis of social interaction and realization of own role in team.

Keywords: bachelor of economics, competence, applied mathematical preparation, pedagogical technologies, pedagogical design, econometrics, decision theory, digital educational resource.

1 INTRODUCTION

Earlier, in their papers, the authors established the methodology of applied mathematics teaching, allocated the problems of realization of technological approach to projection of the content of applied mathematics training [Vlasov, Sinchukov, 2012, p. 62]. It is certain that applied mathematics training plays a significant role for development of professional competence of a future bachelor in economics during his/her study in economical university. The study is dedicated to improvement of the content of a future economist's professional training in economical university [Vlasov, 2018], methodological features of implementation of applied mathematics training for a future economist, by the example of actuary methods are presented in this paper [Suhorukova, 2018].

In the frameworks of this article, we will analyze the ideas of competence-communicative approach, whose implementation within the practice of mathematics discipline teaching, contributes to improvement of applied mathematics training for a future bachelor in economics. The need for professional activity cooperation, skills of well-developed dialogue communication between scientific and professional community is constantly increasing. In the context of professional training of a future bachelor in economics in economical university, it is also necessary to highlight connection between communicative competence and possibilities of intellectual entrepreneurship in the integrate information space, and activity-related cooperation under conditions when socio-economic relationships are getting more complicated.

2 LITERATURE REVIEW

In the frameworks of implementing ideas of competence approach presented in the studies conducted by V.A. Bolotov, I.A. Zimnyaya, A.A. Verbitsky, V.M. Monakhov [Bahtina, Monakhov, 2018], V.V. Serikov [Serikov, 2017] and al., we faced the necessity of projecting development of professional competence of bachelor in economics, taking into account allocation of sets of universal and professional competences essential in the future professional activity. We should highlight that, traditionally, competence is interpreted as ability to act efficiently, to act skillfully. Methodology of applied mathematics training for a future bachelor in economics, in the frameworks of which the competence approach is being implemented, is targeted to development of multiple universal competences. Among them, there are cognitive, regulative, reflective-status, normative and communicative competences. The listed competences may be considered relatively universal for all the directions of future bachelors' training. We should highlight that the necessity of organizing the work on development of students' communicative competences is indicated in the study by [Mukhanov, 2019]. The authors define possibilities of implementation of learning communication under conditions of individualization and differentiation of teaching mathematics processed in technical university.

The problem of enhancing professional training quality of the future students has been discussed in several pedagogical studies. It is notable that, in building the system of the future economists' training for value-oriented business communication, it is necessary to consider that economists' professional business communication consists in business interaction implemented according to the objectives of organizations and optimization of economic activity. In particular, in psychopedagogical studies, we distinguish the following levels of future specialists' development: competence [Korol, Brovka, 2018], which consists in professional and key competences related to the ability to study and grow professionally, readiness to learn the information and share experience and knowledge; client-oriented approach which implies acting for the company clients' benefit); corporate culture and responsibility (regarding interests of the company, skills of team work, intention to achieve final result); quality, safety and diversification [Abramova, Shilova, Varankina, Rubanova, 2019] (orientation to quality and efficiency management, safety ensuring); creativity and innovations (submission and support of initiatives, implementation of innovations); leadership and team building [Titova, 2018] (work with motivation component of the activity and ability to persuade without administrative pressure).

Practice of implementation of the competence approach required taking into account that, in different types of activity of graduates of economical universities, there are different levels of professional relationships. In particular, communicative competence is differently presented in different training directions for the future bachelors in economics (considering their specialization). It is interesting that technological implementation of competence approach during applied mathematics training in economic universities contributes to strengthening of pragmatic, practically oriented, applied and humanistic orientation of the study process.

In pedagogical science, there is a special communicative approach, whose ideas come to focusing attention to sharing communicative experience in the educational process, as well as effective forms of communication relevant in the future professional activity. Elements of communicative approach implemented in the frameworks of methodology of applied mathematics training for a future bachelor in

economics, demanded from us realization and implementation of general communicative principles used in different educational situations of practical interaction, approximated to the future professional interaction. Technological implementation of the elements of communicative approach contributes to the development of verbal and nonverbal languages of communication of the future economists, and the necessity of their development is reflected in the paper [Sadow, Peeters, Mullan, 2019].

The new-generation state educational standard of the Russian Federation, which regulates training of a future bachelor in economics in economic university, distinguishes the following categories of universal competences related to development of communicative competence as a component of professional competence, which received informal direction in the frameworks of applied mathematics training of a student in the university of digital economics and information technologies – G.V. Plekhanov Russian Economic University: “Systemic and Critical Thinking” (the context of building and study of economic-mathematic models, analysis of relevance and utility of the achieved results, discussion of the results of economic-mathematic modelling from the practical point of view, analysis of economic efficiency of the achieved results, etc.), “Development and implementation of the projects” (optimum management of the available resources, skills of goal-setting and spreading of decision-making procedure, assessment of the project development under different information condition, external and internal communication, etc.), “Team work and leadership” (social interaction in building and study of economic-mathematic models, clarification of socioeconomic problems and situations, distribution of works, etc.), “Communication” (communication in spoken and written forms, including use of new digital technologies, information exchange in the frameworks of cooperative interaction, dosing of information under conditions of antagonism, etc.), “Cross-cultural interaction” (notion of variety of socioeconomic problems and situations in historical, ethical and philosophical contexts).

3 METHODS OF THE STUDY

In spite of prominent trend of mathematization and digitization of economics and economical studies, under modern conditions, the skills of economists’ spoken and written language, different ways of communication, fluent speaking at least one foreign language under conditions of global information environment, remain essential. Implementation of competence-communicative approach contributes to optimization of lingvo-psycho-mental information exchange between members of community, in order to insure interaction mutual understanding. In the frameworks of competence approach, communicative competence of the future economists is “the basis of their professional competence.” It is certain that communicative competence is system-forming, and connected with other competences.

In the practice of applied mathematics training for a future bachelor in economics, we implemented the following didactic blocks: “block of communication” (which implies purposeful and systemic information exchange), “block of association” which stimulates dialogues between the bachelor students at interpersonal level, “block of events” which ensures notional, communicative, spiritual unity, for example, in presentation of the team project. We can’t help highlighting the role of labour market, active learning methods and digital technologies [Okunkova, 2018, p. 355] in relevance of competence-communicative approach in applied mathematics training for a future bachelor in economics. However, in order to diagnose the results of the learning, we faced the necessity of defining a lot of criteria and didactic conditions which form communicative competence as a component of professional competence.

Further, we will dwell upon the main ideas of pedagogical technology theory, which acts as the tool of implementation of communicative-competence approach. According to pedagogical technology theory [Monakhov, 2018] the subjects of educational process are a teacher and students, at the same time, as the main object of pedagogical projection, we can view learning and cognitive activity of the students, including implementation of new digital technologies and digital resources of educational purpose.

4 PRACTICAL RELEVANCE, SUGGESTIONS AND RESULTS OF THE IMPLEMENTATION

Mechanisms of pedagogical technologies developed by V.M. Monakhov’s scientific school, allowed us to enhance the students’ self-organization, self-control and activity through reforming of study methodology for applied mathematics disciplines, projection of educational process on the basis of united informative-methodical logic, projection of the bank of individual educational trajectories. In particular, inclusion of applied tasks with new-type socioeconomic content in the content of applied mathematics training for a future economist allowed to reveal potential of the future economists at more extent, their abilities and possibilities for effective activity in future professional and educational situations. Among such tasks, we can point at the tasks in the field of decision-making theory, whose solution methods cover different socioeconomic situations [Carrasco, 2011, Sharafutdinov, 2018, Bykanova, 2018], tasks in the field of

statistical and econometric modelling [Tikhomirov, 2017, Tikhomirov, 2018, Tikhomirov, 2019], tasks in the field of computing mathematics [Dvoryatkina, 2017, Karabutov, 2016].

Inclusion of the new applied tasks with socioeconomic content, and realization of didactic conditions for development of communicative competence at more extent contribute to creation of choice and success situations during the educational process, as well as enhance efficiency of pedagogical interaction. For each informative typical task, we have developed a system of questions with different levels of difficulty for discussion, which actualizes communicative cooperation, collaboration among the students of economic faculty. The question system is oriented to achieving deeper understanding of the content of the socioeconomic situation in question, as well as creation of the relevant quantitative method of its research, choice of the necessary tool. Work with question system, solution of applied tasks, application of new digital products of educational purpose, public presentation of the revealed optimum solutions allowed to organize interaction of teachers of mathematical disciplines and students of economic faculties in a different way. The objective of this study is staged inclusion of all the members of educational process in different types of activity, which contributes to enhancement of communicative interaction in collaborative solution of applied tasks with socioeconomic content.

A new direction for development of this educational and cognitive activity became work with digital products of educational purpose, implemented in the practice of professional establishment of a future economist in Plekhanov Russian Economic University. On each topic of educational disciplines :computing mathematics”, “econometrics”», “theory of decision-making”, “theory of risk”, in order to implement communicative-competence approach, we developed supporting questions which allow to organize all the levels of real and digital students’ communications: inside the group of the students, between the students and the teachers, between the students and the members of professional community, etc.

Primary results of experimental work in the Institute of Digital Economics and Information Technologies (72 students), financial faculty (221 students), faculty of remote education (303 students), faculty of international business (320 students) witness to principal efficiency of our methodical approach to improvement of applied mathematics training for future economists. Over 50 % of students noted deficiency in development of communicative competences and insufficient attention of the teachers to their development by means of mathematical disciplines. In particular, involvement of the students from the experimental group has increased by 37 %, level of anxiety in learning of applied mathematical disciplines has reduced by 24 %. Over 80 % of students have spoken in favour of spreading this methodical approach to teaching other disciplines, including life science profile. By the results of learning the discipline “theory of decision-making”, the control instrumentation shows growth of residual knowledge of the students (by 12 % in solving typical tasks; by 7% in solving tasks of integrative nature without use of digital tools, ant by 15% - tasks of integrative nature using digital tools). We can also note that the objective of the full study of the effect from implementation of competence-communicative approach in training of a future economist in economic university remains unstudied and needs comprehension, also from the point of view of system-activity and technological approaches.

In conclusion of this paper, we will present the bank of supporting questions for students’ communication in the frameworks of the educational discipline of econometrics, whose content allows the students to study means, methods and models of quantitative analysis of the laws of socioeconomic theory. We should note that their basis is mathematical and statistical apparatus. Immersion of the students of economic faculty in the content of this educational field allows to form the students’ skills in the field of modelling of the functions between parameters of socioeconomic phenomena and processes, basing on different types of statistical data and new digital tools. The content of the designed bank of supporting questions reflects classical principles of theory of probability and mathematical statistics, as well as socioeconomic statistics. The main concepts and competences in the field of econometrics and econometric modelling are relevant for the students of economic faculty in their research activity, as well as in learning other study disciplines connected with mathematical modelling and quantitative methods.

Communicative module 1 “Linear models of multiple regression”. 1.1. Characterize econometric model. What does it mean to characterize econometric model? How to characterize econometric model at full extent? What parameters are used to describe econometric model? Does multitude of these parameters depend on complicity of econometric model? 1.2. What is the difference between linear and non-linear econometric models? By what reasons, linear econometric models are relevant in the practice of decision-making? 1.3. What is the informal meaning of econometric model coefficients? Do coefficients of econometric model always subject to informal interpretation? 1.4. What are the properties of assumptions underlying regression model. Does multitude of these assumptions depend on the analyzed socioeconomic problem? 1.5. What is

the meaning of Gauss-Markov theorem? What should be done if the terms of this theorem are not observed?
1.6. Characterize main hypotheses on properties of estimations and statistical criteria of check-up. What digital tools support realization of statistical criteria of check-up for econometric models.

Communicative module 2. "Multicollinearity. Heterogeneity of the data structure. Fictitious variables.» 2.1. Characterize phenomenon of multicollinearity of explanatory variables. 2.2. What is the connection between multicollinearity and quality of regression model? 2.3. Substantiate necessity of fictitious variables in regression model. How to go to inclusion of fictitious variables in building econometric models? 2.4. Through which do we set the goal of building the models of socioeconomic problems with heterogeneous data structure? What is the succession of building and analysis of econometric model under conditions of data structure heterogeneity in various digital tools?

Communicative module 3. "Problem of regression model specification". 3.1. What is the meaning of regression model specification? 3.2. What are the reasons and the consequences of incorrect specification of regression model? 3.3. How to keep the balance between use of the experience of econometric analysis, socioeconomic laws and correlative fields for correct specification of regression models? 3.4. What is implied by linearization of non-linear functions? 3.5. Characterize possible interpretations of main types of econometric functions.

Communicative module 4. "Models of regression with heterogeneous and autocorrelated errors". 4.1. Characterize phenomenon of heteroscedasticity (heterogeneity) of the residue. 4.2. How do properties of regression model depend on heteroscedasticity? 4.3. Characterize procedure of heteroscedasticity of the residue revealing in the process of econometric modelling. 4.4. List and characterize methods of defining error autocorrelation in the process of econometric modelling. 4.5. Describe means of autocorrelation removal. 4.6. Work with Heterogeneity and autocorrelation in digital tools.

Communicative module 5. "Econometric modelling". 5.1. What are the reasons of relevance of systems of econometric equations in socioeconomic studies? 5.2. What is the similarity and difference of the models of econometric equations and simple models of multiple regression? 5.3. Give the examples of socioeconomic processes and phenomena whose study requires application of independent equation systems. 5.4. Give the examples of socioeconomic processes and phenomena whose study requires application of recursive equation systems. 5.5. Give the examples of socioeconomic processes and phenomena whose study requires application of interdependent equation systems. 5.6. Why is it necessary to transform structural form of the model into the reduced one? 5.7. When the whole econometric model is identifiable and super-identifiable? 5.8. Describe the milestones of implementation of econometric modelling in different digital tools.

5 CONCLUSIONS AND DISCUSSION OF THE RESULTS.

We consider learning tasks related to future professional activity and demanding search of optimum solution a basis for the content of applied mathematics training for a future bachelor in economics. The bank of applied tasks created on the basis of socioeconomic situations and implemented in the educational process in mathematical disciplines, requires from the bachelors in economic university "discovery" and mastering of quantitative methods for solving a wide range of the problems related to optimization, making optimum decisions, choice of optimum strategy, in their educational and cognitive process. These tasks, as a rule, have integrative nature. Besides, they often have not only one solution, and different solutions by different criteria of optimality. These informal characteristics require great attention of teachers of mathematical disciplines in economic universities paid to the problem of students' communication. Versatile analysis of a socioeconomic situation or problem is impossible without developed communicative competence of the economist, revealing itself at different levels, starting from communication with the colleagues by typical model, communication with the sources of information (socioeconomic data and instrumentation), and ending with communication with the clients – persons making their decisions, and communication with those who perform these decisions.

We consider communicative component of applied mathematical task as a special educational situation which arises independently during its solution, or organized by the teacher. This situation requires interaction of participants of the educational process for building and study of the relevant economic-mathematical model. Projection of development of communicative competence for the future bachelors in economics requires combination of traditional and new educational technologies directed to formation of the new-type communication in the students – in digital educational and professional environment. Implementation of competence-communicative approach to applied mathematics training for a future bachelor contributes to formation of the competences in the field of search, critical analysis and synthesis of professionally relevant

information, application of systemic approach for the objectives of the future professional activity on the basis of social interaction and realization of their own role in the team.

Creation of didactic conditions for successful learning of communicative standards and variants of communicative behavior by the students of economic faculty in different educational and professional situations requires great attention of the teachers of high economic school, Methodists, psychologists and pedagogues - researchers. Consideration of integrative possibilities of new digital technologies and new digital resources of educational purpose must be An important guiding line for improvement of didactic conditions. Content of applied mathematics training for a future economist, whose key elements are "econometrics", "theory of risk", "theory of decision-making", "computing mathematics", and related to the quantity substantiation of the decisions, has a high potential for enhancement of communicative activity of the students, construction and interpretation of communicative actions in the frameworks of the educational process.

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