Pedagogiczne nauki

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FEATURES OF TRAINING ECONOMISTS AT THE UNIVERSITY IN THE PROCESS OF LEARNING MATHEMATICAL DISCIPLINES

Summary. The importance of Mathematics and its influence on the development of personality are shown in this article. It was determined that the purpose of conducting mathematical subjects to future economists lies in getting acquainted with a typical base of mathematical knowledge and mathematical instruments, and in preparing (familiarizing with) experts to new forms of activity. Such features of mathematical training in higher education economics were found: fundamental character of mathematical disciplines, the need for propaedeutic training on the material of the seniour school mathematics, teaching large amount of material, a large number of tasks, the use of new information technologies.

Keywords: mathematical education, the goal of learning mathematics, features (peculiarities of) mathematical training.

I. Introduction. Nowadays, the traditional view on the content of teaching mathematics and its role in the training of economists is changing. Mathematical education is treated as a phenomenon that reflects in various fields of person's activity and is influenced by mathematics' teaching [2, p.61]. A high-quality mathematical education is necessary not only to those who will be engaged in research, but also to business leaders and economists. Mathematical way of thinking, the ability to think accurately in a logical sequence are required by engineers, economists, lawyers, historians, biologists, physicians, and others. Therefore the course of mathematics in high school plays an important role in preparing specialists.

Strengthening of the impact of mathematics on the development of science and industry, expansion of the use of mathematical knowledge, the process of mathematization of basic human activities greatly increase the value of a complete education for every student. Thereby, the mathematical education of future economists is considered by us as an important component of basic higher education.

It is a common knowledge that the main goal of teaching mathematics in higher and vocational school is to teach students how to apply mathematics as a tool in solving a number of various problems that arise in the profession activity as well as in practical life situations, so that they have professional and applied mathematics competence.

Historically, there were two views on the purpose of mathematics education: first being practical, associated with the creation and use of tools, required by people in their productive activity; the second is intellectual, associated with person's thinking and with acquirement of a particular method of learning and transformation of reality with the help of mathematical methods [10, p.61]. Study of a set of mathematics subjects not only promotes the accumulation of specific knowledge and skills, but also influences intellectual and creative activity, development of different ways of students' thinking, and influences the development of personal and professionally significant qualities of future professionals to enable them to fulfill themselves in the area of their future careers [11, p.5].

Analysis of scientific and educational literature has shown that the solution to the problem of the development of scientific and methodological foundations of students' mathematics education in higher education in the context of improving the competitiveness of future economists according to the needs of society with a market economy, is found in studies on a wide range of issues concerning methods of teaching mathematics in high school. These are works related to the development of methodical system of practical lessons and techniques of individual work with students of economic specialties of higher educational institutions; with the foundation of methods of forming mathematical culture of economists students at the university; with the determination of the ways of implementing interdisciplinary connections of Informational technologies and Mathematics in preparing professionals in the sphere of economics at the universities, etc. (G. Buldyk, N. Vanzha, G. Dutka, G. Evdokimov, V. Kelbakiani, V. Klochko, A. Kolomok , G. Myhalin, N. Morse, I. Novik, N. Samaruk, V. Skatetskyy, O. Fomkin, etc.).

Various aspects of this problem are developed also by foreign researchers, including N. Balashov, A. Bishop, R. Vodkin, S. Grander, R. Haris, R. Ashley, A. Cameron, J. Klein, A. Rayyen, A. Sierpinski, Z. Turrou, W. Schmid. However, in the works of the mentioned scientists little attention is paid to the peculiarities of the mathematical training of economists.

II. Formulation of the problem. The aim of the study is to find out and analyze key aspects of the mathematical training of economists: to determine the role of mathematics in professional training of future economists, the object of the study of mathematical sciences, characteristics of the study of mathematical subjects in high school.

III. Results. Math has deeply penetrated into all spheres of human life. It has great potential for the development of analytical and logical thinking, spatial imagination, algorithmic culture, forming the skills to establish relationship of cause and effect, to prove assertions, to shape situations, and leads to the creation and development of intellectual abilities.

Mathematical training is important from various points of view:

- Logic (the study of mathematics is the source and means of mental development);

- Cognitive (through math people perceives the world around them, its spatial and quantitative relations);

- Applied (Mathematics is the base that ensures a person's ability to master the related disciplines and many professions);

- Historical (not only the development of mathematics itself, but also of human culture and society can be traced in the history of mathematics);

- Philosophical (mathematics allows to understand the physical world, and form an idea about the real physical space) [9, p.14].

The **objective** of teaching mathematical subjects to future economists coincides with the vector of strategic directions of Mathematics Education and lies in:

- supplying students as future professionals able to achieve a high level of professionalism based on traditional forms of activity with typical mathematical

knowledge basis and appropriate mathematical tools;

- preparing professionals to new promising forms of activity, i.e. their obtaining of the professional competence based on the creative application of mathematical analysis and methodology of mathematical and statistical modeling and socio-economic forecasting of consequences of their possible future jobs.

Of course, the study of mathematics itself can not substitute synthesizing impact of basic economic education disciplines at the level of formation of economic thought. But its integration with other disciplines is necessary for the development of intelligence. It should be noted that there are broad opportunities to use mathematical tools and methodological techniques for concise descriptions of the objects studied; and in providing opportunities for quantitative comparison and substantiated choice of substantive proposals, logical hypotheses of identifying existing implicit factors that affect the dynamics of economic indicators. We revealed specific features of methodological tools of mathematics as a science, which is borrowed from the general arsenal, but updated and detailed by special methods, namely: the method of mathematical induction and deduction, axiomatic construction of theories, proving theorems and their consequences, mathematical analysis, multivariate analytic transformations, computing procedures and algorithms, tabular and graphical representation of information and mathematical modeling [7, p.82].

Features of the study of mathematical sciences at the university of economics are the following:

- fundamental role of mathematical knowledge and skills in the students' mastery of economic subjects;
- integrative and predictive functions of mathematical knowledge;
- professional orientation of learning mathematical sciences by students of economic specialties;
- orientation for selecting the content of teaching material for the mathematical sciences to integrate mathematical and economic sciences;
- applied nature of mathematical disciplines (usage of mathematical methods, concepts and laws while studying specialized subjects) [9, p.15].

Consider these features of the mathematical preparation of future economists in more detail.

1. ***The fundamental nature of mathematics.***

Math courses cover a significant part of the fundamental component of economic education and provide students with the necessary mathematical tools, develop the ability of effective and creative usage of mathematical tools in future professional activity, raise the level of professional competence [2, p.61]. Most of economic laws formulated in the language of mathematics and a large number of economic concepts have economic meaning as well.

As the driving force of the development of mathematical training we recognize, agreeing with the researcher G. Dutka in the dual principle of fundamentalization and professionalization of education, which detects in the education system some contradictions between needs and available means of satisfying them, which may be supplied by science and practice, due to the discovery of new facts and relationships as well as the advent of practical requirements that stand in need of the development of new theoretical knowledge [3, p.240].

Fundamentalization of mathematical education of future professionals enables us to consider it in interaction with their professional training. The process of emergence of new personality traits is accompanied by integrative vision on the phenomena or objects as an entity. The most significant is that fundamentalization of mathematics education is a means to transfer of mathematical knowledge into new quality – professional and mathematical knowledge, including such an important components of intellectual discipline as responsibility, independent thinking and integrity [3, p.241].

2. ***Mathematics as a basic science is taught on the first years of study.***

Mathematical preparation of students of economic specialties consists of the study of classical and applied mathematics, as well as its use in the study of other disciplines.

The basis of mathematical training received by a specialist in economic field is the general course of higher mathematics, which includes those topics of probability

theory and mathematical statistics the knowledge of which, according to curriculum, is the minimum necessary amount for mastering the material of forthcoming disciplines [1, p.7]. Generally in most higher educational establishments of Ukraine mathematical disciplines are taught in the first three semesters of study. According to the curriculum for students of economic specialties in Khmelnitsky National University, teaching mathematics to juniour students lies in course "Mathematics for Economists" and covers the following subjects: "Higher Mathematics" and "Theory of Probability and Mathematical Statistics."

3. ***The study of mathematical disciplines requires propaedeutic training in mathematics at high-school.***

To study the mathematical sciences the student should have received basic training during the course at high-school because the university discipline is a continuation of the school course of mathematics.

4. ***In mathematical training the level of students' mathematical education should be taken into account.***

Since mathematical disciplines are studied by economists in the first year of studies, their school level of basic mathematical training should be taken into account. An important factor in decrease of the quality of the mathematical training of economists is a discrepancy between the level of mathematical knowledge of secondary schools and higher education requirements to their IT and computer training. This discrepancy can be demonstrated by the results of the entrance test in elementary mathematics, which is held on the first lesson of the course "Mathematics for Economists". The study of learning skills possessed by students, allows us to specify and empirically substantiate the main tasks of a focused creation of learning activities suitable for the student's age, and to clarify the content and scope of knowledge required for learning techniques, as well as the forms and methods of self-study [8, p. 11].

5. ***Mathematical training involves teaching large volume of material.***

Course of mathematics in universities is the longest one, so training program of economists mastering mathematical disciplines involves teaching quite a substantial

amount of theoretical and practical material. The total volume of mathematical knowledge increases at the same rate as the whole set of scientific information. At the same time in the structure of mathematical knowledge repeated compression of information in applied fields of mathematics takes place [2, p.66-67].

With the reduction of workload dedicated to the study of higher mathematics it is not possible to simultaneously build general and professional mathematical training of future economists. Consequently, developing abilities to use mathematical tools in solving problems of future professional activity mainly occurs during independent work. Leading forms of independent work of students in the study of mathematical disciplines are individual assignments, performance tests, working process with them directly involves other independent learning activities. Thus complex of professional individual tasks should aim at improving the mathematical preparation of future economists, the formation of professionally important mathematical skills, implementation of students' learning activity.

Independent work of students is developed on the grounds of:

a) content of the training course, chapter or topic of a subject being studied;

b) general methods and techniques of enhancing the learning process (teaching methods, methods of training, types of learning activities, learning tools);

c) characteristics which depend on the tasks that are the basis of independent work (composition of their components, the level of difficulty, the order of application) [8, p. 12].

A thorough understanding of educational material while working independently is possible on the basis of systematically active work of astudent. To ensure constant active work of a student in learning on distance next features must be considered: prevailing efficiency of learning on distance is based on motivation because future professionals ought to feel the necessity for further studies. They are not sensitive to pressure of a teacher, dean and so on. They have the ability to work with educational materials in such mode and amount that fits directly to them [6, p.34].

6. ***Presence of large number of tasks.***

The acquisition of mathematical disciplines knowledge occurs in 90% of cases

due to the problem solving. Solving problems is a practical method of mastering mathematics. No other discipline is actualized to such extent with this method.

Mathematical training of economists has its own special features connected with specific economic problems, as well as a large variety of approaches to their solution. These problems are primarily problems of collecting and processing statistical information as well as problems connected with the assessment of the status and prospects of economic processes. There are different ways to use the obtained information to solve such problems - from simple logic to the compilation of complex economic models and developing mathematical tools of research. Uncertainty of economic processes, wide random variation and a large amount of information studied involves necessity of applying probability theory and mathematical statistics to the research of economic problems. These areas require knowledge of basic linear algebra and mathematical analysis, probability theory and mathematical statistics, economic-mathematical methods and models.

7. ***Solution of large number of problems (for example those connected with mathematical statistics) involves cumbersome calculations, so it's essential to use new information technology (NIT).***

Educational use of information technologies widens significantly possibilities of individualization and differentiation of education through: learners' activity as a subject of cognition, independent choice and students passing trajectories of study material assessment and acquisition.

Featured above affects the organization of the study of mathematical disciplines.

To stimulate the motivation of mathematical training of economists in the study of mathematical disciplines it is needed to solve not only mathematical problems solely, but also applied problems that would interest students and show them they are learning mathematics to solve applied problems of economy. Besides it's essential to show the possibilities of mathematical methods in computer implementation in addition to economic problems.

Tasks with economic content in the study of mathematics allow students demonstrate the presence of links between mathematics and economics and promote

interest in the study of mathematics. One of the major goals is to develop the economic way of thinking in students' heads. Construction of mathematical models of the economy shows that achieving results is possible due to the interaction of mathematics and economics [2, p.64].

Implementation of interdisciplinary connections in the process of mathematics learning can be done in two ways:

- different usage of applied problems at various stages of learning mathematics, as well as general and professional subjects

- wider use of general and professional disciplines in applied problems [4, p.16].

Other than that it's important that links of mathematical concepts and methods with economic problems are not artificially contrived and reasonable.

Training of economists involves professional orientation of the course. The basis of professional orientation training should be based on principles of professional consistency and continuity, main instruments of which are means of mathematical modeling and the presence of typical applied problems as well as fundamental principles, preparation for future professional activities, access to new mathematical ideas provided the rules of sufficient amount of formal tasks, professional certainty and applicable content are being carried out [5, p.11].

To meet the challenges of future economists preparation it's needed to improve basic education efficiency and consequently the building process of mathematical culture and economic thinking.

IV. Conclusions. Summarizing, it can be claimed that the mathematical training of specialists in economy is based on a differentiated, competence, integrative, person-activity approach and the principles of professional orientation, intensification, optimization and concentration of learning, consciousness and activity, connectivity of theory and practice, along with other commonly accepted didactic principles. The features of the mathematical training of students of economic specialties alnalyzed allow to activate the restructuring process of mastering mathematical disciplines by students of economic specialties in higher educational institutions of Ukraine according to the needs of society with market economy, which

is the prospect of our future scientific research.

References

1. Бех О. В. Проблематика вивчення математичних дисциплін студентами економічних спеціальностей /О. В. Бех // Теорія та методика навчання математики, фізики, інформатики: Збірник наукових праць. Випуск 4: В 3-х томах. – Кривий Ріг: Видавничий відділ НМетАУ, 2004. – Т. 1: Теорія та методика навчання математики. – С. 7-9.
2. Дутка Г. Я. Особливості фундаментальної математичної підготовки майбутніх економістів /Г. Я. Дутка//Гуманізація навчально-виховного процесу. Зб. Наук. праць.- Слов'янськ. – 2011.- Вип. LVI/ - С.60-70.
3. Дутка Г. Я. Фундаменталізація математичної підготовки майбутніх фахівців: методологічний та морально-естетичний компоненти / Г. Я. Дутка// Наука. Релігія. Суспільство. – 2008. - №2. – С. 239-244.
4. Королева В. А. Педагогические условия обеспечения профессиональной направленности математического образования студентов колледжа: дис… канд. пед. наук: 13.00.08./ В. А. Королева: – Москва, 2003. – 143 с.
5. Крилова Т.В. Наукові основи навчання математики студентів нематематичних спеціальностей (на базі металургійних, енергетичних, електромеханічних спеціальностей вищого технічного закладу освіти): автореф. дис... докт. пед. наук: 13.00.02/ Т. В. Крилова: – К., 1999. – 15 с.
6. Лебедева Е.В.Методика обучения студентов экономического профиля теории вероятностей на основе прогнозирования: автореф. дис. … канд. пед. наук. – Орел, 2009. – 17 с.
7. Нічуговська Л. І. Адаптивна концепція математичної освіти студентів ВНЗ і конкурентоспроможність випускників: методологія, теорія, практика. - Полтава: РВВ ПУСКУ, 2008. - 153 с.
8. Пастушок Г. С. Методика вивчення математики на економічних факультетах вищих закладів освіти: автореф. дис…канд. пед. наук: 13.00.02/Г. С. Пастушок: – К., 2000. – 15 с.

9. Самарук Н. М. Професійна спрямованість навчання математичних дисциплін майбутніх економістів на основі міжпредметних зв'язків : дис. ... канд. пед. наук : 13.00.04 - теорія та методика проф. освіти / Н. М. Самарук ; ТНПУ ім.В.Гнатюка. – Тернопіль, 2008. – 21 с.

10. Шепелева Ж. Н. Педагогические условия обучения старшеклассников конструированию экономико-математических моделей : дис. на соискание науч. степени канд. пед. наук : 13.00.01 / Ж. Н. Шепелева – Белгород, 2004. —186 с.

11. Щетініна О. К. Математичні дисципліни в системі професійної підготовки майбутніх фахівців / О. К. Щетініна //Застосування та удосконалення методики викладання математики: матеріали XVII регіонального науково-методичного семінару. – Донецьк. – 2011. – С.4-6.