"The Turkish Vector" Influence on Teaching the Exact Disciplines in Modern Educational System of Kazakhstan: on the Example of Teaching Algebra and Mathematics

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Abstract

The article deals with the main problems of mathematics teaching in schools and Kazakhstan pedagogical university, as well as the practical application of acquired knowledge in solving problems. Systems of the higher education of Kazakhstan and Turkey are compared. The paper deals with the professional quality that must possess a specialist to be able to apply their knowledge in practice and pedagogically competent to transfer their students. Until now, the question remains about the mathematical preparation of the future teacher. Therefore, when organizing the learning process, solving mathematical problems, the teacher is primarily faced with the need to filter the tasks, organize them, analysis of the intellectual actions that will have to fulfill the students in the process of problems solving. In this article the classification problems, which would help the teacher to carry out their selection in accordance with the intended didactic purpose, are recommended. Good pedagogical education is necessary for all because questions of psychology, pedagogics everyone needs to study for education of the children, for work in collective. When training in mathematical disciplines, the ability to analyze, draw conclusions, logically to think is taught.

Introduction

Currently, higher education has become the main priority for today's youth. Previously, many have sought to graduate, and get a degree at the prestigious universities of the United States, Germany, England, but today choose also other countries of Europe, including Turkey. If to compare the Kazakhstan and Turkey higher education system, it is possible to talk about their similarities. In both countries, higher education is divided into three levels: undergraduate, graduate and doctoral studies. The Turkish universities diplomas are appreciated in Europe and the United States. The higher education system includes universities, academies and high schools. Turkish universities are very popular among foreign students. Of course, an important role in this belongs to the stable political and economic development of the country. Kazakhstani students prefer the Turkish universities because of the close linguistic, cultural and historical links of our country with Turkey.

In Kazakhstan, many new documents were accepted in the recent years – this is a new state educational standard of general secondary education, approved by the Decree of the Kazakhstan Republic Government of August 23, 2012 №1080, and training programs, in accordance with which it is necessary to change the teaching method technique in recent years. In just a few years, the high school changed its status, that is, there are many alternative schools such as lyceums, gymnasiums, colleges, special schools with in-depth study of specific subjects. For example, in many cities of Kazakhstan became popular Kazakh-Turkish high schools – a network of schools under the direction of the International Public Foundation "KATEV" in Kazakhstan, which was created in 1997 through the agreement between Kazakhstan and Turkey in 1992 to coordinate with the Turkish side of the educational institutions work. Under the leadership of the International Public Foundation "KATEV" are 28 Kazakh-Turkish lyceums, the university named SuleymanDemirel, Zhambyl Economic College in theTaraz city, elementary school "Shahlan", International School "NurOrda".

These changes lead to new requirements for the teacher as well as his professional training in teaching at the university. Highly qualified expert should not only possess the science fundamentals, and apply their knowledge in practice, to be able to transfer knowledge pedagogically competent students. Until now, the question remains about the mathematical preparation of future teachers.

Mathematics gives people the opportunity to master the learning methods and the world understanding, teaches research methods, both theoretical and practical problems. At all times, mathematics plays an important role in the scientific, technical and economic development. Owning mathematics has always constituted the nation strategic resource. Currently, due to the increased role of mathematics, an unusually large number of future economists, programmers and organizers of modern production requires serious mathematical training, which would enable the mathematical methods to explore a wide range of new problems, apply modern computer technology, and use theoretical achievements in practice.

The global integration processes in science and the productive economy sphere with the need demanded qualitatively new heads of production, which, in turn, forced to carry out a critical analysis of all the training patterns. Transition from training of

"narrow experts" for training of widely educated persons (Karabulatova, 2013) was proclaimed.

Researchers consider as important quality of the expert ability creatively to approach the solution of the tasks faced by them. With all the variety of meanings of this term, creative approach can mean creation of the necessary mathematical model and its studying. The maintenance of the mathematics general course cannot be defined from purely pragmatic point of view based only on specifics of students' future specialty without internal logic of the mathematics and reasonable severity of the material statement.

The modern Kazakhstan school structure represents division into the young level (primary education: 1 – 4 classes), the average level (main secondary education, i.e. 5 – 9 classes) and the senior level (general secondary education, 10 – 11 classes).

Features of Training the Algebra Course at High School and Pedagogical Institute

Algebra studying begins at the main school in the seventh class. Algebra is one of the most important mathematics sections. It is the language of science and equipment. With its help, many phenomena and processes, happening in the nature and society, are modelled, studied and predicted. Algebra provides studying of other school subjects, first, subjects of the natural and mathematical cycle, in particular physics, informatics, geometry (Abylkasymova, 2013). In the State obligatory standard of the Kazakhstan Republic the following objects of training in algebra are set: the basic fundamentals of algebra studying by the students, formation at them high culture of interpersonal and interethnic communication, self-determination of the personality both vocational guidance, and problems of training:

1) ensuring the high-quality assimilation of the algebra bases directed on education and development of the personality intellectual qualities: abstract and logical thinking, intuition, cognitive interests, independence, strong-willed qualities, etc., mathematical speech, algorithmic and graphic culture;

2) development of the pupil identity, his spiritual sphere through familiarizing with the values which are saved up by mathematical science during its development;

3) the pupils intellectual development through mastering the induction and deduction, generalization and specification, analysis and synthesis, abstraction and analogy; ability to prove and prove statements;

4) development of the independent work skills, ability to self-education, self-assessment during the performing of individual tasks and group work; granting to pupils of possibility of tasks independent designing of this subject, their decisions; development of ability to be guided in a flow of the arriving information;

5) the personality qualities education providing social mobility, ability to make independent decisions;

The communication culture education, respect for the history, culture and traditions and other values of the Kazakh people and other ethnic groups living in Kazakhstan; respect for the senior generation and the younger care; the active position in environmental protection; high patriotic feelings; ensuring pre profile preparation for training in natural mathematically direction at the general secondary education level, corresponding to their abilities and interests, future profession and promoting satisfaction of individual educational interests, requirements and tendencies of each pupil, doing training differentiated (Kazakhstan Republic Government, 2012).

According to the conducted researches, the studied algebra course today by eyes of pupils is represented as science about the equations solution. However, within the XIX-XX centuries algebra sharply changed the contents, having turned into the science about mathematical structures of a special look, first of all, groups, rings and fields. These objects are the basis of school algebra that remain "shadow", deep; they are not formulated in an explicit form. Actually, the maintenance of the algebra school course is the only applications of these algebraic concepts, which cannot be considered as the full contents, and the subject studying purpose (Nadyusha, 2013).

If these "shadow" concepts bring out of the shadows and include in school algebra course, it would be contrary to the account age characteristics of students, the situation is worse misunderstanding of the school course. Nevertheless, the teacher must, in order to expand the horizons, talk about some abstract algebra concepts related to the school specific sections, so that students did not arise a feeling of exhaustion algebra material studied at school. It will be of interest for the discipline further study.

For successful training of mathematics teachers in higher education institution, there has to be a course, at which contents there is all school mathematics that passes smoothly into high school disciplines, such as the mathematical analysis, linear algebra, analytical geometry, algebra and the theory of numbers, which are already studied in separate disciplines. Of course, this course has to level the first-year students' knowledge, considering that all of them graduated from different schools in different areas, and do not have the identical mathematical preparation. For example, such course is included into the work program of the 5B010900 specialty – "Mathematician" and it is called –"Elementary mathematics" for which three credits are provided. The discipline object is the purposeful formation and the systematized knowledge development and abilities of future mathematics teachers to solve the school course problems, necessary for the preparation of highly qualified teaching staff in mathematics, having social and civic liability, capable to carry out the civil activity. Prerequisites of this course are school mathematics, algebra and geometry.

This course application will provide a good basis for the first-year students studying mathematical disciplines chosen specialty and prepare professional mathematics teachers.

Some Training Aspects in the Mathematical Analysis Course at the Senior Step of High School and in Pedagogical Institute

At the high school senior level, training is based in two directions: socially – humanitarian and natural – scientific. One of the difficult, but necessary disciplines studied in 10 and 11 classes is algebra and the analysis beginnings. The training purpose is to ensure the high-quality assimilation of algebra and the analysis bases on achievement of the necessary level of the general intellectual development of the personality based on national and universal values, logical formation, abstract and probabilistic thinking, the practical basis creation of the further effective training. According to the training program for 10 – 11 classes of the comprehensive school public and humanitarian direction, the training problems in algebra and the analysis beginnings are:

1) the education of the relation to mathematics as parts of the universal culture playing a special role in the social development; expansion of idea of students in the mathematics application;

2) formation of the mathematics ideas as universal language of science, as the description form and the knowledge method of reality, the mean of modeling phenomena and processes; roles of mathematical model in scientific knowledge of the real processes;

3) the personal qualities formation that are needed in today's society, typical for the mathematical activity: the ability to clearly and exactly express your thoughts, have algorithmic culture, critical and logical thinking, intuition and the ability to overcome difficulties;

4) mastering system of the mathematical knowledge, the development of computational algebraic skills necessary for application in practice, the study of related disciplines, continuing the education;

5) the systematic study functions as an important mathematical object by means of algebra and mathematical analysis, the disclosure of the applied value of the common mathematics methods concerned with analysis functions;

6) the development of combinatorial and probabilistic thinking; improvement of intellectual and speech skills by enriching the vocabulary of mathematical terminology (Abylkasymova, 2013).

The knowledge gained when studying this course is fundamental for the entrants going to the universities in various directions as the mathematical analysis is included into the UNT tasks. Therefore it is important that pupils learned to take not simply, for example, derivatives or to calculate integrals on known formulas, and from the very beginning to understand the importance of this section for mathematics and life, can operate with the main terms and formulas, be able to put the gained knowledge into practice.

Training problems of the profound practical importance are formulated for the natural and mathematical direction:

1) ensuring high-quality assimilation of the algebra bases and the analysis beginnings aimed at the personality intellectual qualities development;

2)   the ideas formation about mathematics as the description form and the knowledge method of reality, the role of mathematical model in scientific knowledge of real processes;

3)   development of the mathematics ideas as the parts of universal culture, the mathematics importance in the civilization history and modern society; expansion of the general outlook of the scientists who are trained the contribution idea at the various stages of the mathematical science development; expansion of representations of pupils about the application areas of mathematics;

4)   assimilation of new approaches to the tasks solution in mathematics, mastering the mathematical knowledge necessary for studying the related subjects at the modern level; application of the mathematical knowledge in everyday life; development of abilities to use the mathematical knowledge in practical activities;

5)   the thinking qualities formation necessary for the person to live in the modern society, for the general social orientation and the solution of practical problems; the students intellectual development; the logical thinking development; potential creative abilities of each student; interest in the subject;

6)   the personality qualities education to provide the social mobility, ability to make independent decisions; development of independent work skills, a self-assessment during the individual tasks performing and work in group; granting to the students the possibility of independent designing of the subject tasks, the decisions, presentations preparation; development of the ability to be guided in a flow of the arriving information;

7)   the pupils involvement in the game, communicative, practical, research activities as the personal development factor (to listen and to understand others, to express yourself, to reach compromise, to interact in group, to find consensus, to work in group, objectively to estimate the activity results and the companions activity);

8)   the creation of conditions for further subjects studying of the natural and mathematical cycle; the abilities formation to apply the studied concepts, properties, rules, algorithms, etc., the received results and mathematical methods for the problems solution of the applied character and tasks from related subjects with use in need of reference materials, the calculator, computer (Abylkasymova, 2013).

Mathematical analysis is the main course in the mathematical education system of the high school students, as in the study and solution of many problems of the higher mathematics used methods and rules studied in this course. One of the fundamental variables research methods is the theory of limits on which built such important sections the mathematical analysis course as differential and integral calculus of functions of one and several variables. With the help of the functions can be formulated not only the laws of nature, the various processes in the production, but

the social laws (for example, calculation of population growth, migration), various spheres of human activity.

For the future teacher it is necessary to understand the bases importance of the mathematical analysis, it should be explained, it should be learned. School level is insufficient for further training in the higher mathematics because students do not realize the need of more profound sections studying; they are not motivated to study the higher mathematics. Training in the mathematical analysis course without awareness of the need reduces learning efficiency. That is, the motivation problem is very important in learning.

In the Kazakhstan' higher educational institutions, according to the classification of the university specialties and post-graduate education, proposed by the Education and Science Ministry, are carried out in two directions: general education and science. What is the difference between the mathematical analysis teaching course at the general educational direction "Mathematics" from the natural-scientific direction? There should be different teaching levels: the level of "love" with the mathematical analysis and in-depth study of the mathematical analysis level respectively. General mathematical analysis course should cover the most important aspects, and in-depth questions can be included in the courses of the disciplines for choice.

There are the "classical" mathematical analysis textbooks –Kudryavtsev, Nicholas, Fikhtengolts, which were written in the middle of the last century and, accordingly, are calculated on the students' level of the last century. Now the students' level is significantly another, motivation has changed too. The contingent arriving on specialty of higher education institution also depends on it. On this depends the contingent entering the specialty of the university. Textbooks on the level higher than the incoming students' level, hence weak absorption of the material, which reduces the effectiveness of the mathematical analysis teaching. Previously, "the most intelligent" is received on physical and mathematical specialty, and then today they seek to enter the economic and legal profession.

After all, in connection with the society transition to the market economy, since the beginning of 1990, legal, economic specialties became prestigious, there was a practical need for the education system humanization, which has led to the increase in hours to study humanities subjects (primarily on the languages study) and the number of hours reduce to the study of natural – scientific disciplines and mathematics in the curriculum. At the same time, mathematics and now takes an important place in the school system of academic disciplines.

Mathematics, unlike naturally – scientific disciplines, studies not subjects of reality, but spatial forms and the quantitative relations of objective reality. Therefore, mathematics investigates abstract objects and this abstractness gives it the universality and formally logical deductibility.

Today in the everyday speech, it is often possible to hear such expressions as "the number of the people who got sick with flu grows in a geometrical progression" or "allocations increased much". These examples prove that more and more wide range of mathematical knowledge becomes an obligatory element of the general culture of the modern person (Abylkasymova, 2013).

Training in mathematics through the mathematical tasks solution

Certainly, the mathematics is taught through tasks. The most important aspect in algebra and mathematical analysis training is application of theoretical knowledge in practice that is ability to solve problems. In considering the problem of the teaching students' methods of the tasks improving, it is necessary to define first the concept of targets and the tasks solution technique interconnected with it. The tasks role and place in teaching math historically remained unchanged. In the L.F. Magnitsky "Arithmetic" (1703) to the task the decisions that it was necessary to "find out" were given. The task was to train, i.e. mathematics and then teach to learn the rules of common tasks. This was mainly used purely applied problems, pursuing practical purpose. With change of the training purposes caused by the society development and the role of tasks changes. S. N. Shokhor-Trotsky (1915) wrote: "Arithmetic tasks have to be not the purpose at reasonable training, but only a tutorial to arithmetic".

Currently, the tasks role in teaching mathematics is defined, on the one hand, the fact that the ultimate goal of this training are reduced to mastering techniques students solve specific problems of the system. On the other hand, it is determined that the full achievement of the program goals is possible only by pupils solving mathematical problems systems. Thus, the solution of problems in teaching mathematics acts as a target and as a learning tool. Activities of the student to address the problem depends on how the problem is refracted in his thinking through the decision process.

However, the improving problem of the mathematics education content in high school cannot be solved only by the range of the studied questions of school mathematics, i.e., the facts of mathematics, its basic laws and theories, containing scientific system of knowledge about the studied objects, processes and phenomena. It is necessary to restructure the school system of mathematical problems, aimed at the generation of knowledge about the methods, assessment and self-evaluation of educational performance and, ultimately, to optimize the learning process and improve its efficiency and quality.

The task concept of psychology characterizes the person activity orientation and purpose, which result achievement is carried out by certain means. Mathematics defines a task through structural elements (V. M. Bradis, V. V. Repyev, A.A. Stolyar, L.M. Friedman). For example, A.A. Stolyar in definition of a task allocates its requirement (Stolyar, 1979). V. V. Repyev indicates the need of functional dependence between its required and these sizes (Repyev, 1978). V. M. Bradis defines a task through a mathematical question, without calling thus its signs (Bradis, 1961). L.M. Friedman allocates structural elements of a task (Friedman, 1987). The essence and the status of the concept "task" can be defined at the structural and functional levels.

The solution plays a crucial role in training courses of algebra and mathematical analysis. Achieving full learning outcome is possible if the application of knowledge to solve practical problems. With this approach, problem solving emerges as a goal and as a tutorial.

The Kazakh schools teach math according to the textbook, developed by the group of authors, led by Professor A.E. Abylkasymova. Tutorials are divided into chapters, and the chapters, in turn, are divided into sections. Each paragraph begins by listing the

reference terms, which were allowed to link previously learned material with a new one. Topic "What gives you the study of the topic?" serves as a reference in the study of new material. Each theme offers jobs for self-fulfillment. At the end of each section are questions which students' answers require a conscious assimilation of the material.

According to each paragraph we suggest exercises of three complexity levels– A, B, and C. The first level (A) assigned exercises, the implementation of which is compulsory for everyone. The second level (B) are exercises of medium difficulty. The third level of complexity Exercise (C) is addressed to those who are interested in mathematics and knows how to creatively apply their knowledge. Chapters of the textbook come to an end with three headings: "Check yourself!", "Historical data", "That you acquired from this chapter?". In a heading "Check yourself!" test tasks which decision gives, which makes it possible to determine how much material is metabolized by the relevant chapter. The "historical data" is information related to the chapter material. Topic "What you have learned in this chapter?" helps make sense of the material studied and highlight the most important of it (Abylkasymova, Korchevsky, Abdiyev, & Zhumagulova, 2012).

Conclusion

It is necessary to know and understand that systematic occupations by mathematics first cultivate in the person such qualities that are important for all-round development of the personality as:
- ability to reason the statements;
- ability to find out the phenomena reason he and to draw conclusions;
- laconicism, i.e. ability shortly and exactly to state thoughts;
- research skills, including aspiration to right generalizations, ability creatively to think;
- persistence in achievement of the purpose (Abylkasymova, Korchevsky, Abdiyev, &Zhumagulova, 2012).

We gave some sayings of the great scientists, researchers about mathematics:
"The one, who wants to resolve issues of natural sciences without the help of mathematics, sets the impossible task. It is necessary to measure that is measurable, and to do measurable that is not", – claimed the outstanding Italian physicist and astronomer, one of the natural sciences founders Galileo Galilei (Fadeyeva, 2016).

The words of the classic of mathematical economy Pareto are now actual: "The economists who do not know the mathematics are in position of the people wishing to solve system of the equations without knowing that it is, that even that is each single equation entering it"(Fadeyeva, 2016).

The American Researcher F. Dyson writes: "The mathematics for physics is not only the tool by means of which it can quantitatively describe the phenomenon, but also the main source of representations and the principles on the basis of which new theories" arise (Fadeyeva, 2016).

The Ancient Greek philosopher Plato spoke: "It would be good if this knowledge the state demanded and if the persons holding the highest state positions accustomed to go in for mathematics and to apply", if necessary, to it.

From the above-stated quotes, it is possible to draw a conclusion that even not mathematicians recognize this science demanded and necessary in any field of activity.

Throughout the mankind existence mathematics was and will be in demand, because in order to be successful in today's society, able to navigate in an ever-changing world, you need to think fast, correct, logical, that's why you need to study mathematics.

The mathematics learning success to a certain extent depends on what tasks, in what order and in what quantities are given to students for work in the classroom and at home. Therefore, the learning process organization of the mathematical problems solving the teacher is primarily faced with the need to filter your tasks, organize them, analysis of the intellectual operations that must be performed to students in the process of problem solving, etc. It requires classification problems, which would help the teacher to carry out their selection in accordance with the intended purpose of the didactic.

Good pedagogical education is necessary for all because the questions of psychology, pedagogics everyone needs to study for the children education, for work in collective. When training in mathematical disciplines teach ability to analyze, draw conclusions, to think logically.

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