Current Status and Prospects of Training Future Teachers of Mathematics for Specialized Teaching in Kazakhstan

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***Abstract* - The paper considers the methods of training future teachers of mathematics for teaching special courses "Methodology of Specialized Teaching of Mathematics" and "Innovative Techniques of Teaching Mathematics" at the Master Study Programs of KazNPU named after Abai. To ensure practical orientation of the training of undergraduates, the schemes «Pedagogical University - Innovative School» are established. With the purpose to educate and train future teachers of mathematics for specialized teaching at schools and classes majoring in advanced teaching of mathematics the following new techniques of modern didactics are considered at the special course "Innovative Techniques of Teaching Mathematics": differentiated learning technique, module learning, information technologies in teaching (computer technology), mastery learning, collective learning, technology-integrated lessons, project-based learning, communicative and cognitive learning and other.**

***Keywords* - Innovation, specialized teaching**

I. Introduction

Nowadays the issue of training future teachers of mathematics for specialized teaching has become particularly topical, taking into consideration the reform of the Kazakhstan secondary education system, which is undergoing the process of change into a 12-year education cycle.

At present education and training of future teachers of mathematics for specialized teaching in the secondary schools and classes majoring in advanced teaching of mathematics to the students with special aptitude for mathematics is one of the priorities of pedagogical universities.

As any other type of educational activity, teaching of mathematics should be performed by professionals. Extensive background and quality education in mathematics are the prerequisites for developing a profound teaching competence in mathematics.

Knowledge of math and mathematical skills are required in a great number of professional fields, particularly those connected with natural sciences, engineering and economics. Mathematics is the language of natural science and technology, and that is why a natural philosopher or an engineer should possess an advanced professional competence and should develop a profound knowledge of many mathematics-related subjects, such as algebra, mathematical analysis, probability theory, and statistics.

Another important reason to study mathematics is the need to develop an ability to understand the essence of the task set, the skills of logical reasoning, and algorithmic thinking. Any individual should be able to conduct analysis and to articulate one's thoughts clearly. At the same time, mathematics is needed to ensure intellectual development of an individual.

II. Analyses of the Problem

Analysis of the current situation in the field of education and training of pedagogical and academic personnel in our country has demonstrated that in general the level of competence of the graduates of pedagogical universities does not completely meet the needs of the dynamically developing economy and education system of Kazakhstan.

The current level of methodological competence of a future math teacher educated and trained for specialized teaching provided in pedagogical universities within the framework of the existing teaching aids on methodology of teaching mathematics on the one hand, and increasing demands concerning professional performance of future teachers of mathematics with regard to specialized and level differentiation, taking into consideration humanization of mathematics education, and adoption of unconventional forms of education on the other hand have lead to the contradiction between the actual and the required levels of methodological competence. That is one of the reasons why it is necessary to consolidate research on the theory and methodology of teaching mathematics, and include the results of such overview into the curriculum of the course on teaching methodology in mathematics for the students of pedagogical universities. That will help improve methodological competence of the teachers of mathematics for specialized teaching.

This task has been implemented using the following methods:

- analysis of the level of mathematical competence of the students in Kazakhstan;
- study of psycho-didactic and methodological literature, teaching aids on methods of teaching mathematics in Kazakhstan;
- logical-didactic analysis of different topics covered in textbooks and study aids on teaching theory and methodology for specialized teaching of mathematics; overview of the experience of the academic personnel of pedagogical universities in Kazakhstan;
- study of the current state and prospects of education and training of future teachers of mathematics for specialized teaching in Kazakhstan.

It has been discovered that the level of mathematical competence has considerably decreased in the last 20 years due to certain objective and subjective reasons:

- many talented young people abandoned academic and pedagogical positions for careers in economic, legal and humanitarian spheres;
- the period of education reforms has taken a long time;
- many private universities were founded, and that has lead to decrease of pedagogical and scientific potential;
- according to new state educational standards, the number of academic hours allocated for learning of mathematics has been significantly reduced;
- low quality of the textbooks on mathematics;
- lack of diversity in forms of assessment of mathematical competences;
- respect to the status of the teacher has decreased in the value system of the market economy.

In order to radically change the situation, a number of systemic measures have been proposed, for example: determining the frame requirements to be met by applicants on enrollment to pedagogical universities and by graduates on graduation from the university; introduction of testing to determine whether an applicant possesses necessary psychological readiness, pedagogical skills, and motivation for acquiring the profession of the teacher.

In order to attract the best students it is planned to increase grants allocated to pedagogical disciplines by 30%, and double scholarships for the students of pedagogical universities. The schemes „pedagogical university – innovative school" are being established to ensure that students receive practical training.

Professional advancement of the teachers is a decisive factor in improving the situation in the field of education and training of pedagogical personnel. This is performed by the Republican Institute of Professional Development of Managerial Personnel in the Education System (RIPDMPES), 16 regional institutes of professional development (IPD), 5 pedagogical university centers.

However, the system of professional advancement of the trenchers operating for decades has not been modernized. It is characterized by poor material resource and methodological basis and lack of innovative solutions in the field of education. Low salary of the training specialists and methodologists, lack of feedback, poor cooperation between RIPDMPES and IPD can be mentioned among the numerous problems currently persisting in this sphere.

At the same time certain progress has been made. According to the UNESCO data, for three years Kazakhstan has taken position in the top four among 129 countries with regards to Education for All Development Index (EDI). We are far ahead of other CIS countries (Belarus – 26th, Georgia – 30th, Tajikistan – 31st, Kirghizstan – 42nd, Armenia – 43rd, Uzbekistan – 48th, Ukraine – 53rd, Moldova – 59th). Kazakhstan is the first state in the Central Asia that has become a full member of the European Higher Education Area (Bologna Process). For the forthcoming decade the main development strategy in our sphere is determined by The State Program for Development of Education of the Republic of Kazakhstan for the years 2011-2020. A special section in the State Program is dedicated to the activities aimed at promotion of the status of a pedagogue. First, it is a significant increase of the remuneration package of the teachers, which should become compatible with compensation levels offered in the private sector. Already since 1 September, 2011, teachers in Kazakhstan receive a qualification bonus amounting to 100% of their basic salary. [1].

Second, the Program envisages a completely new approach to professional advancement of the pedagogues. We plan to establish centers of pedagogical mastery on the basis of Nazarbayev's Intellectual Schools. The best teachers of Kazakhstan have been selected; they will share their experience on a permanent basis. The program envisages introduction of a voucher-module type of financing. Having received the voucher, the pedagogues will be able to choose the most appropriate options for advancing their professional qualification, including foreign professional development centers.

Third, the improvement of the public image of the pedagogue should promote the status of the teacher. Another important aspect is increasing the involvement of the teacher in managing the education system in general, in developing and modernizing this system at the state level. That is why improvement of the quality of teaching mathematics should be the starting point for improvement of the quality of the entire education system. This process has become of even greater importance regarding the transition of the secondary education system to 12-year cycle. The entire paradigm of education is going to change – from knowledge-based approach to competence-based approach, i.e. education should develop ability to use the acquired knowledge in various real life situations. Absolutely new teaching methodology is required. And of course, the main factor in implementing the State Program is basic education and training of the teachers for specialized teaching at the universities, which is the main area of our activities.

The main aim of the specialized school majoring in natural sciences and mathematics is teaching of the children of the Republic of Kazakhstan, who have special aptitude for these subjects. The schools provide advanced teaching of mathematics, physics, and informatics, they also strive to promote students' independent scientific thinking. Ultimately, this will lead to the development of intellectual elite of Kazakhstan, which is competitive and able to self-actualize in the contemporary world.

The Republican Specialized Physics and Mathematics Secondary School (RSPMSS) named after O. Zhautykov can be mentioned as an example. In 37 years of its operation, more than 6,000 students finished the school, who now successfully work in different branches of economy, science, and business. Many of them hold responsible positions in the administration of the President, the government of the Republic of Kazakhstan and other state institutions. New generation of RSPMSS school leavers is not less ambitious, the students study in the best universities of the world. Recent

results attest that RSPMSS is one of the best schools not only in Kazakhstan, but also in the educational space of CIS and other foreign countries [2]. In addition, 'Nazarbayev's Intellectual Schools Specializing in Physics and Mathematics' are established in every regional center.

Currently new normative documents and regulations are being developed: new State Compulsory Education Standards, study programs, textbooks and integrated methodological teaching aids. According to the reviews of international experts, new State Program is highly advanced. It provides efficient mechanisms and indicators that can ensure that education system in Kazakhstan reaches new heights.

At presents academic and teaching personnel of Kazakh National Pedagogical University named after Abai (KazNPU) take part in the development of new study programs. Great effort is invested in advancing professional qualification of university lecturers teaching mathematics, in development of the system of professional advancement and further training of the pedagogical personnel. Thus, our specialists take part in modernizing the education process at educational establishments at all levels: pre-school institutions, schools, universities, teaching personnel professional advancement institutions, etc.

One of the research projects implemented at the Department of Informatics, Mathematics and IT in Education of the institute supervising Master and PhD study programs at KazNPU named after Abai is "Scientific and Methodological Fundamentals of Training Post-Graduates for Specialized Teaching". Special courses "Methodology of Specialized Teaching of Mathematics", "Innovative Techniques of Teaching Mathematics", "Contemporary Issues of Mathematics Teaching Methodology" and other courses are taught at the Master degree study program of KazNPU named after Abai.

At the lectures Master students acquire knowledge on specialized teaching of mathematics at secondary schools and classed majoring in mathematics as well as in other specialized schools. Specialized teaching is the means to differentiate and individualize teaching, which allows considering the interests and aptitudes of the students more comprehensively by changing the structure, syllabus and organization of the study process.

The idea behind modernizing the specialized school is that each pupil is given more opportunities to choose an individual learning program. Real life experience has proved that it is useless to teach 'everything to everybody'. Teaching of senior pupils should be based on consideration of their interests and ambitions. That is the reason why the issue of specialized teaching has become so topical nowadays.

Transition to specialized teaching pursues the following main aims:

- to ensure advanced learning of definite study subjects of the comprehensive secondary education curriculum;
- to provide conditions for development of differentiated syllabus for senior pupils to ensure they have ample opportunities and sufficient flexibility to develop their own study programs.

The curriculum of the course "Innovative Techniques of Teaching Mathematics" covers the following innovative techniques of contemporary didactics: differential learning technique, module learning technique, information technologies in teaching (computer technologies), mastery learning, collective learning, integrated learning, project-based learning, health-saving technologies, communicative and cognitive learning, etc.

At the practical classes, the instructor supervises the following activities:

- problem-based learning;
- game-based learning;
- information and communication technologies;
- creative and non-standard activities, differentiated tasks at the practical classes;
- project-based learning and research.

The methods specified are aimed at detecting the most efficient ways to develop active independent reasoning of the Master student as well as to activate their cognitive activity with regard to organizing and conducting specialized teaching of mathematics.

At the practical classes each Master student chooses the most efficient teaching methods for work with the students majoring in mathematics and compiles a syllabus of the lesson. Using the most efficient combinations of these methods allows the teachers to maintain the interest for cognition and motivation for self-development among the students.

III. CONCLUSIONS

Innovations in the sphere of education are aimed at personal development, at the development of the ability to perform scientific and technical as well as innovative activities, at the improvement of the education process.

The aims of the academic personnel with regard to education and training of future teachers of mathematics for specialized teaching are far reaching. These aims include creation of the environment for self-development of Master students and provision of quality education. Master students should learn how to solve problems which might arise in different real life situations in their professional practice.

In the long term on reaching these aims a university graduate will get the opportunity to obtain learning outcomes in terms of developed key competencies, and to develop sets of pedagogical and methodological skills as well as master professional activity modes in specialized teaching.

Introduction of innovations, analysis of the existing cutting-edge technologies used for teaching mathematics, sharing experience with the leading schools in teaching methodology in mathematics (Japan, Poland, Russia, Ukraine, China, Latvia), development of efficient training aids (study methodology, study aids, e-textbook), creative approach to implementation of the tasks set, all these measures may considerably improve the quality of education in Kazakhstan.

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