Preparation of the mathematics teachers of the Republic of Kazakhstan in the conditions of informatization of education

Bakhytkul Kaskatayeva

Kazakh National Peadagogical University Abai, 13 Dostyk ave., Almaty, 050010, Republic of Kazakhstan

Abstract: *The paper considers the preparation of the future teachers of mathematics to the professional activities in the conditions of informatization of education. The model of training the future teachers of mathematics to a professional activity is analyzed. The model is characterized by the integrity of the structures formed a unity of purpose, organizational principles, content, forms and methods of training. The potential for learning using ICT is analyzed the creation of real contexts for (1) learning the multiplicity of types of visual presentation, (2) encourage the active and reflexive learning; (3) increase of the graphic skills and (4) increasing the effectiveness of time consumption for the solution of the problem.*

Keywords: training, education, mathematics, methods of teaching, informatization.

Introduction

One of the acute problems of the modern higher school is the problem of preparation of the future teachers of mathematics to the professional activity in the conditions of informatization of higher education. In accordance with the Concept of education development of the Republic of Kazakhstan for the period up to the year 2015, and with the Strategy of informatization of the educational system of the Republic of Kazakhstan till the year 2020, in our Republic are determined by the basic directions of activity on introduction of modern information technologies.

The modern information society puts forward new requirements to the training of education in matters of use and the production of an information resource of the Internet, development of methods and means of informational interaction in the local and global networks, realization of opportunities of information and communication technologies (ICT) in the process of self-recovery and knowledge representation. The demand for teaching staff, able to work in conditions of the use of distributed information resource information networks, able to take responsibility for the realization of the opportunities of ICT in their professional activities, ready to continually improve their professional level adequately modern trends in the development of the information society.

However, in the practice of teaching of higher mathematics in the modern education school these issues are not always given due attention. The computer becomes more accessible, the Internet has a wide distribution in the entire world. Through the Internet the vast amount of information becomes accessible, but we need to teach students to receive this information, assess its quality and use correctly. Information communication technology forms a new perspective on learning and teaching. Learning can no longer be viewed as a process in the framework of the lecture notes and textbooks. Many studies show that ICT is an excellent tool that contributes to the formation of new ideas about the processes of teaching and learning.

The decision of problems of preparation of the future teachers of mathematics to the professional activity, as it seems to us, is in the creation of a fundamentally new didactic system or learning model, implying the optimal informational interaction of the teacher and graduate students, as well as a master student and computers in educational process of higher education institution (University).

A model of training the future teachers of mathematics to a professional activity under the conditions of informatization of education is presented and analyzed in this study.

The model of training the future teachers of mathematics

Under the didactic system of means allotted by the certain criteria of holistic education didactic systems and models are characterized by integrity of structures formed a unity of purpose, organizational principles, content, forms and methods of training. We have developed a model of training the future teachers of mathematics to a professional activity (Fig. 1) and an electronic textbook on the theory and methods of teaching mathematics (Bent and van den Brink, 2005; Kaskatayeva, 2009).

The main aim of our research is the development of methods of preparation of the future teachers of mathematics to a professional activity under the conditions of informatization of education and the definition of the forms, methods and means for its implementation.

It's very important for the solution of this problem is the attitude of teachers to the informatization of the educational process.

The results of the pilot study in our Institute of magistracy and PhD studies at KazNPU named after Abai. The application of the information technology maintenance of educational process on a number of cycles of

disciplines show, that already today in the conditions of informatization of education significantly change the role, place and tasks as a teacher, and students.

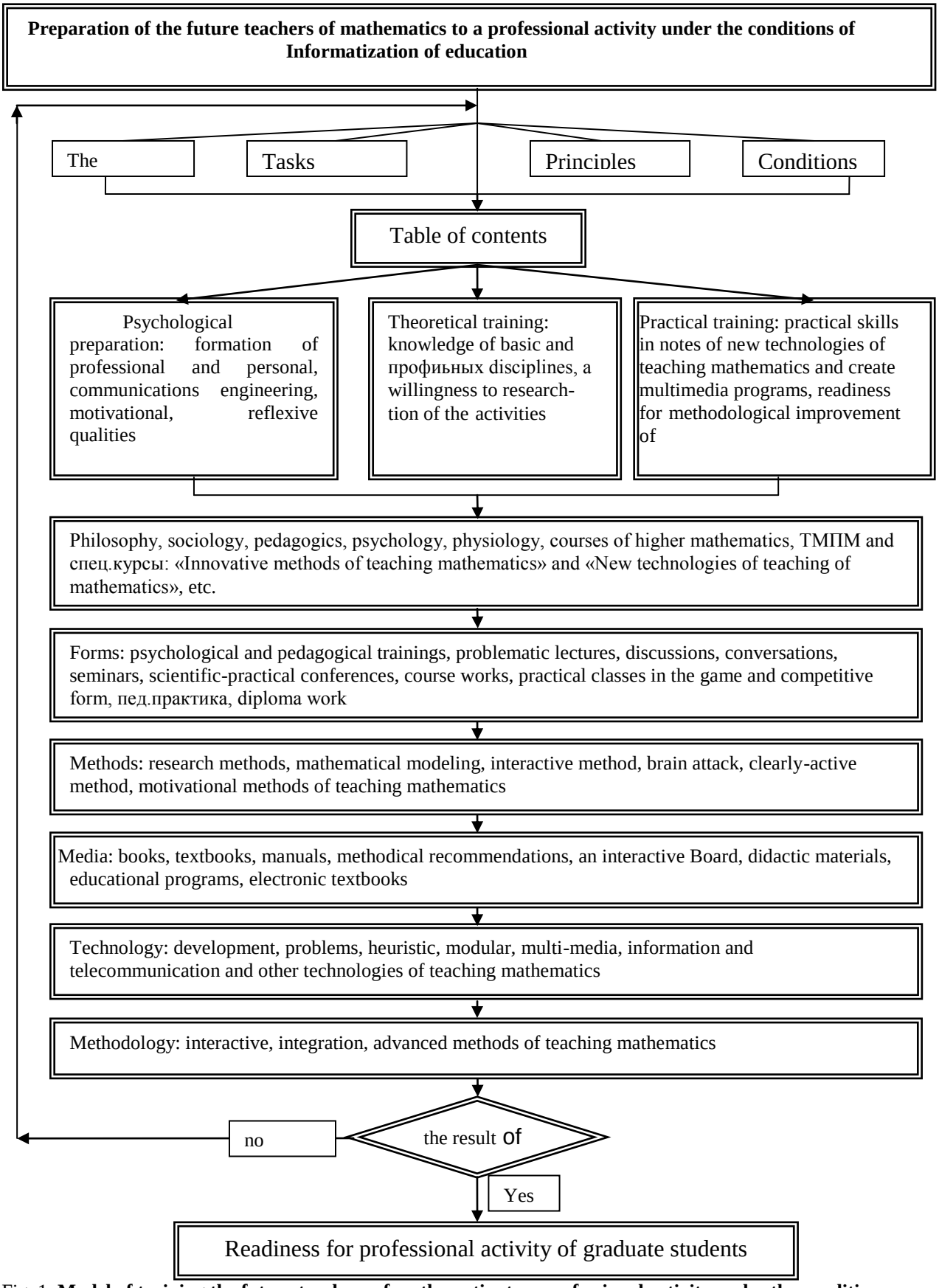

Fig. 1. **Model of training the future teachers of mathematics to a professional activity under the conditions of informatization of education.**

All it is, accordingly, entail conversion of the main components of the educational process: the changing nature of the joint activity of its subjects; the ratio of the didactic functions, implemented in the system «teacher-computer - student»; the complex of programs and technologies of teaching mathematical disciplines; modified methods and forms of training.

Informatization of society is at the present time objectively happening process. Its feature is that one of the main activities of the members of the society are processes related to the collection, storage, processing and translation of information.

In connection with this, one of the leading directions of the process of informatization of a society is the process of informatization of education, which provides education methodical and practical tools for creation and use of information technologies for the purposes of training and education.

One of the main issues of informatization of education is preparation of future teachers of mathematics on the basis of modern requirements of pedagogical science. At the present time at our Department there is some experience in the study of the problems of theoretical and methodical preparation of students of teacher training colleges.

The problem of preparation of the future teachers of mathematics at pedagogical universities of is carried out by means of the following forms, means, methods and technologies.

Forms: psychological and pedagogical trainings, problematic lectures, discussions, conversations, seminars, scientific-practical conferences, course works, practical classes in the game and competitive form, degree work;

Equipment: electronic educational and methodical complexes (EMC), textbooks, manuals, methodical recommendations, an interactive Board, didactic materials, educational programs, electronic textbooks.

Methods: research methods, mathematical modeling, interactive method, «brainstorming», clearly-active method, motivational methods of teaching mathematics.

Technology: development, problems, heuristic, modular, multimedia, telecommunications and information technologies of teaching mathematics.

Use of the possibilities of multimedia technology for presentation of audio-visual information for educational purposes and developed on the basis of multimedia courses significantly extend the capabilities of educational material presentation including through the inclusion of animation, sound and video. In addition to the new forms of presenting the information programs, developed on the basis of multimedia technology, have another valuable from the methodological point of view of quality - of interactivity, which allows more completely realize the learning effect of these training tools.

Wide potential possibilities of multimedia technology were put in front of pedagogical science problem on two interrelated areas: methodological aspects of the application of multimedia technology for mathematics and methodological aspects of creation of multimedia programs of academic appointments in the system of training the teachers (Portfolio, 2005).

The rapid development of telecommunication networks and based on their information technology has a huge impact on all areas of the education system, both in our country and abroad. The impact of new information technologies in the education system appears in two ways. On the one hand, these technologies allow increase of the efficiency of educational process, scientific research and management of educational institutions.

On the other - the system of education, especially higher, is an active participant in the process of development of information technologies and information resources.

It is important to note that the role of the teacher in the conditions of informatization of education is not only the leading, but also is enhanced even more. This is due to the fact that the teacher carries out its in the new educational environment, which is characterized by the use of modern means of information.

Thus, the content of activity of the teacher of an increasingly creative nature, which requires from him constantly update their knowledge and professional growth. The problem of quality of preparation of teachers to work is particularly acute in the principally new conditions of their professional activities.

Experience of the KazNPU named after Abai

In this connection, the methodical Council of the Institute of magistracy and PhD studies at the KazNPU named after Abai hold training seminars for the staff (PPP) of the Institute:

1) the technology of e-learning;

2) interactive technologies in teaching.

And also the administration of the Institute pays attention to:

- the provision of the disciplines of the departments of the Institute of educational-methodical literature;
- to the material-technical provision of the educational process;- on introduction in educational process of modern information and educational technologies.

In the block of natural science disciplines all the professional educational programs of scientific-pedagogical directions included special courses «New technologies of teaching mathematics», «the Basics of e-learning and virtual innovation», who are currently performing the role of interdisciplinary science, technology, and methods which are integrated in the General-professional and special disciplines of the training of future teachers.

The teaching of mathematics has its own specific characteristics, though the methods of teaching and method of organization of educational material, it would seem, is traditional theoretical information, practical studies, conducting the control measures. This is due to the fact that all branches of mathematics are developing rapidly. That requires constant updating of the educational-methodical ensure that the most optimal for the electronic submission of the educational-methodical and information support. It should also be noted that specific feature of the study of mathematics with the help of information technologies, as the «duality» of its basic element - a computer, which is both the object of study, and at the same time learning tool and instrument of accomplishing the tasks.

Specific peculiarities of studying mathematics with the help of information technologies bring to the forefront the problem of such organization of educational process, in which the student is the subject of the educational process, the individual aspiring to self-realization and self-government of its academic activities, and the teacher becomes the organizer of independent active cognitive activity of students. In these conditions the realization of «subject-subject» of relations communication teachers and undergraduates will become joint creative activities, but not limited to the transfer of knowledge. In higher educational institutions of the primary organizational form, in the framework of which formed the foundations of subject - subject relations, are the lectures. The lecture is a leading, the base element of didactic training cycle: its aim is the formation of an indicative basis for the subsequent learning by the students of educational material.

The peculiarity of lectures in comparison with other organizational forms of the educational process is its activity framework, which causes the need for training undergraduate independent study activities, including the following:

- the implementation of the necessary preparation for the lecture classes;
- mastering the methods of sustained attention and active comprehension of material during the lecture;
- development of their own management systems taking notes of the lectures;- the addition of the abstract after the lecture;
- the absorption of lecture material, self-control and execution of creative independent works on the basis of the lecture material (Kaskatayeva, 2011).

Thus, the lecture is teaching the organizational form of the educational process, which is a very economical way to get the fundamentals of scientific knowledge, is a powerful means of activating the cognitive activity of undergraduates, the means of development of the vision of the problems and abilities of independent identify approaches to their solution, as well as contributes to the development of the masters skills of self-government of its academic activities.

The actual solution of optimal organization of educational process in high school-e, as it seems to us, is the creation and application of multimedia lecture complex at the highest mathematics, which includes not only didactically-informational tool, multimedia lecture Annex, module testing the knowledge of lecture topics, but also the module of self-organization of extracurricular work on the lecture material.

In the beginning of the academic year graduates hear a syllabus, where there are:

- abstracts of lectures;
- a brief description of the seminars and practical classes (plans, tasks to conduct seminars and practical classes, iwst, CDs);
- themes and a brief description of the laboratory and Studio work;
- tasks for self-evaluation and preparation for the examination, including tests, a list of basic and additional literature, including in electronic media;
- the list of Internet resources;
- glossary.

Presenting the lecture material, the teacher focuses on the fact, as undergraduates outlines the training material. The deliberate note-taking includes listening, comprehension, processing and brief record. The lecturer of the following: all the students understand and time to process the academic information. It is very important to the lectures of feedback, which when using the multimedia lecture complexes can be implemented in the form of mini-self-test, which is carried out after each topic of the lecture material. Graduates on the screen is provided 3-5 issues, and every listener, in answering these questions, controls their assimilation to the taught material, comparing their answers with the answers, which opens a lecturer on the expiration of the time allocated to the self-test.

At the end of the lecture the lecturer pays attention to the most difficult questions of the lecture material and recommends educational literature, as well as periodic publications on these topics for extracurricular work with the Ukrainian educational material.

The most important condition of mastering the material you listened to the lectures is extracurricular independent educational activity of students on the deeper comprehension and memorization, which includes several interrelated stages. The first stage of this activity is to read and substantive revision of the outline of the lecture.

On the practical (Seminary) lesson after the technical design of the abstract should be re-reading of the lecture material with a view to a more profound understanding and digestion of the material. At the same time he should

be aloud or silently reciting the key provisions of the lectures, definitions, formulas, conclusions, etc., because multiple read without playback does not provide knowledge.
The periodic repetition of the lecture material is the means of lasting scientific knowledge mastering subject areas and creates preconditions for long-term retention and assimilation of the studied material, as every new treatment to one and the same material opens up new facets of, who had previously escaped from the attention.
During the time of independent work of master students under the guidance of the teacher (IWMSUGT) conducted the study of scientific and educational literature on the themes of the lectures, the expansion and deepening of the knowledge, acquired skills to work in subject areas. This stage it seems to us very important from the point of view of the development of the masters skills of self-government of its academic activities.
In the process of work with the scientific editions develops creative scientific thinking, is forming information culture of the future teachers. But the theoretical study of the scientific and educational literature on special courses of higher mathematics necessarily should be complemented by the implementation of creative independent works. Only in this case the independent educational activity undergraduates will contribute to the assimilation of knowledge of the subject region, development of the ability to work with information: analyze, compare, organize, classify and generalize, ownership of abilities and skills to apply the knowledge in practice.
As practice shows, systematic monitoring of the implementation of independent creative work on the lecture material from the teacher with the traditional organization of the educational process is difficult. It is necessary to involve themselves undergraduates in the process of self-assessment of knowledge and skills obtained in the course of studying of mathematical courses. For the training of undergraduates analysis of their knowledge and training actions we offer them to create a collection of his works on the mathematical rate.
And if the previous stages of the lecturer are controlled by the periodic review of abstracts of lectures, conducting workshops, the interim reports, the control IWMSUGT and independent work of master's degree students is a method of portfolio.
At the present time, this method of evaluation of quality of knowledge of students - the method of the portfolio is of great scientific and practical interest. Analysis of scientific-pedagogical literature shows that this method is mainly found a use in the school and in University practice (Chernilevsky, 2002). For teachers of the higher school of this method is applicable for the training and promotion of a masters the skills of self-government of its training activities, including training lecture.
The method of portfolio is a method of evaluation and self-evaluation of knowledge, which involves the presentation and documentation of their knowledge in the subject areas, as well as taking into account the ability of pupils to the decision of non-trivial tasks and skills for joint work.
The portfolio as a method involves the creation of a «portfolio of student». Problem-based portfolio in mathematics, as an information and control the means of educational activity of master, reflects the dynamics of the educational, labor, intellectual activity; level of skills and skills in the field of information technologies; develops an interest in mathematics, critical attitude to his activity; forming and developing the skills of self-government of its academic activities, and teachers provides optimal variant of the evaluation of various educational results the activity of graduate students: academic, creative, labor, management, and also allows you to evaluate the dynamics of the development of information culture of the author of the portfolio.

Conclusions

This, information and communication technologies (ICT) in education are needed in the preparation of future teachers of mathematics to the professional activity in the conditions of informatization of education, as:

- ICTs can contribute to the solution of some problems of education;
- ICT increase the motivation to learn and play an increasingly important role in society;
- ICTs can contribute to the implementation of a new perspective on learning and teaching.

How to place information and communication technologies in the training programme? There are two main possibilities. First, ICT can be an object, the object of which will be computer literate. Secondly, ICT can be an important aspect of the study related to professional practice. ICT is also a means for learning and teaching.
Future teachers need to teach the correct use of ICT in the learning process. ICT as a means of learning and teaching tool that helps implement innovative methods of training.
The potential for learning using ICT are as follows:

- the creation of real contexts for learning;
- the multiplicity of types of visual presentation;
- encourage the active and reflexive learning;
- increase of the graphic skills;
- increasing the effectiveness the use of time for the solution of the problem.

In the use of ICTs in education need to take into account a number of conditions:
1) the condition of using the potential of ICT in education is the need to restructure the curriculum and a training plan, which should have a greater focus and more depth,
2) And also is necessary in syllabus give thorough job for active work of graduate students and stimulate their thinking.

Thus, the necessity for the use of information and communication technology (ICT) in education and developed a model of training the future teachers of mathematics to a professional activity under the conditions of informatization of education.

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