

The Development of Readiness for Labor among the Bachelors with Pedagogical Education

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Abstract: The adoption of a teacher professional standard in Russia requires from a modern teacher, the readiness for the implementation of their professional activities in accordance with the structure and the content of labor actions specified in this standard. This entails the change in the standards of his preparation in a high school. The purpose of this study is to analyze the compliance of a teacher labor action system to the competence system of Bachelor with a teacher education as well as the to the study outcomes specified in the federal state standard of general education. On the basis of this analysis the conclusion about the necessity of programs update for the Bachelor of teacher education in universities. Within the project of teacher education update fundamentally new training modules for teacher training programs are developed. The participation in this research is performed by Elabuzhsky Institute of the Kazan Federal University. One of the developed programs in mathematics and the results of its testing are provided as an example. They showed an increased ability and the willingness of students to fulfill the labor actions stated in the program. The presented materials may be useful for the developers of the basic educational programs for the bachelors with teacher education and also for universities engaged in such training within the framework of network cooperation with the institutions of secondary education.

Key words: Teacher professional standard, labor actions, competences, federal state educational standard, the preparation of the mathematics teacher

INTRODUCTION

The development of the modern pedagogical education in Russia is related with the development of a set of measures which allow to improve the quality of a teacher training by bringing all the parameters of education in line with the Professional Standards of a Teacher (PST).

The analysis of a teacher professional standards is carried out in the works of Mayer *et al.* (2005) and Thomas and Kearney (2008).

The ways of pedagogical education modernization are presented in the researches of Margolis (2014a, b), Safronova and Bysik (2014), which stated that the modernization program of a teacher education should be directed to:

- The change in the content and the technology of a teacher training so as to ensure the implementation of new professional standards and new standards of school education
- The improvement of university operation efficiency implementing the training programs for teachers

The issues of a competence approach to the modernization of education are considered in Nishanova *et al.* (2014) research.

The requirements to a teacher in PST are listed in the form of labor actions. Let us analyze, labor actions in terms of their formation possibility among future teachers. First of all we are interested in the training of teachers of mathematics.

MATERIALS AND METHODS

Competencies of the Bachelor with teacher education: According to the Federal State Educational Standard of Higher Education (FSES HE), the mastering of undergraduate programs by a graduate in respect of 44.03.05. Teacher education shall develop common cultural (OK-1-9), general Professional (OPK-1-6), Professional (PK-1-14) or Professionally-applied competences (PPK-1-9).

Then, the contents of certain competencies in the knowledge and skills is revealed using the example of a bachelor with a teacher education according to the profile “Mathematics and Informatics” (Table 1). At that the

requirements of the Basic Educational Program (BEP) of the Basic General Education (BGE) are taken into account.

Labor actions for PST: The study “General pedagogical function. Education” PST enumerates 10 labor actions (TDO1-TDO10). The section “Educational activities” considers 12 labor actions (TDV1-TDV12) in the study “development activities” 11 labor actions (TDR1-TDR11). The study “Generalized labor function” provides the educational activities on the design and the implementation of basic and secondary education programs PST and introduces 7 labor actions (TDP1-TDP7).

Let’s establish the correspondence between the competencies of FSES HE and developed labor actions declared in PST, as well as the FSES requirements of the basic general education (FSES Ltd.) (Anonymous, 2010) (Table 2).

Special labor actions of a mathematics teacher: Research on the creation of professionally oriented methodical

systems of mathematics teaching in a high school are held since 1980s (Mordkovich, 1986). The experimental results on their implementation confirm that some PST labor activities may be developed within these systems (Gilmullin, 2009, 2015; Anisimova and Krasnova, 2015). Then, the labor actions are considered in a special PST module subject teaching, Mathematics (let’s denoted them in an abbreviated form TDM1-TDM23). The highlighting of this module is determined by the specific place and role of mathematics in education. The concept of mathematical education in Russian Federation notes that mathematics occupies a special place in science, culture and public life. This role of mathematics is reflected in the regulations: sample programs for academic subjects. Mathematics, draft basic educational program of an educational institution primary school.

A mathematics teacher solves triple task of training, upbringing and development. But, he does this primarily by the means of mathematics. Table 3 lists the part of labor actions from a special unit and their respective descriptors.

Table 1: Competences of teacher education baccalaureate according to FSES HE

FSES HE	Competence content	Knowledge	Skills
OK-3	The ability to use scientific and mathematical knowledge for the guidance in modern information environment	The basics of the mathematical model for the solution of practical problems for the obtaining, storage, processing and transfer of information The application of the simplest basic mathematical models in the educational field	To create the situations that motivate to the mathematical activity To create, apply and translate signs and symbols, models and schemes in order to solve educational problems
PK-1, PPK-1	The readiness to implement educational programs on the subjects according to the educational standard requirements	Mathematics within the requirements of the GEF and the GEP Work program, textbooks and the methods of mathematics teaching	To plan and carry out the educational process in accordance with GEP To develop a work program on the basis of approximate GEP and to ensure its implementation

Table 2: The correspondence of competencies according to FSES HE, labor action on PSP and learning outcomes of the GEF Ltd.

FSES HE	Labor actions	FSES Ltd.
OK-3	The development of skills related to information and communication technologies (TDO8) The development of the ability for logical reasoning and communication (TDM1)	The development of the ability to apply the learned concepts, results and the methods of problem solution from the related disciplines The development of formalization skills and information structuring
PK-1, PPK-1	The performance of professional activities in accordance with FSES requirements for basic and secondary education (TDO2) The development of universal educational actions (TDO7)	Studying the development of interdisciplinary concepts and universal educational actions Studying of specific skills, the activities for new knowledge obtaining and its transformation and use in training situations during the study of mathematics

Table 3: The labor actions of a mathematics teacher

TDM	Labor actions	Descriptors
1	The formation of ability to logical reasoning and communication	Develops logical reasoning together with the students. Ensures the inclusion of all students in the educational process
2	The formation of ability to comprehend the basics of a real object or a process mathematical model	Creates and uses visual representations of mathematical objects and processes together with the students
3	The formation of specific knowledge and skills in mathematics and computer science	Easy handling with basic mathematical concepts. Demonstration of the ability to solve the problems of elementary mathematics
9	The development of students' ability to apply the means of information and communication technologies for an effective solution of the problem	The drawing of sketches on paper and an interactive white using the computer tools on the screen, the creation of three-dimensional models using a computer
11	Cooperation with other teachers of mathematics, computer science, physics, economics and others	The demonstration of the ability to participate in interdisciplinary projects
15	Assistance in the preparation of students for the participation in competitions, contests, research projects and conferences	The solution of competition problem. Understands the topics of educational and research projects
23	Maintaining of a dialogue with students or a group of students in the process of a problem solution	The analysis of the argument offered to students

RESULTS AND DISCUSSION

“The concept of a teacher education development support” requires to bring the system of teacher education in line with PST and FSES education. It is supposed to improve the “practical training, the strengthening of all training component links with the practical professional tasks of a teacher; the saturation of curriculum with an extensive system of practices, trainings”.

As you know, when the practical tasks are performed the effectiveness makes 75%. The most effective form of practice is the teaching of others, i.e., an immediate application of knowledge and skills in practice 90% (Golovanova *et al.*, 2014; Wouter *et al.*, 2006; Ganeeva, 2014).

In Yelabuga Institute of Kazan Federal University (YI KFU) within the execution of the state contract the educational model projects were developed. In particular, the module “scientific and mathematical knowledge in educational practice” is aimed at the implementation of domestic and international requirements for professional qualities of a teacher, namely, the ability to handle information and to evaluate it critically.

The structure of the first semester developed module included the discipline “Mathematics and the basics of data Mathematical processing” (MiOMOI), after the development of which a student shall achieve the following learning outcomes:

- The solution of practical problems which occur during the work of a teacher, using the mathematical models
- The performance of mathematical processing concerning the results of pedagogical activity

Let’s correlate the relevant educational outcomes with the labor actions, necessary knowledge and skills from the PST (Table 4). The competence of FSES HE corresponds to listed labor actions as the part of MiOMOI discipline development: “the ability to use scientific and mathematical knowledge to guide people in the modern information space” (OK-3).

The goals set by the PST and MiOMOI discipline require a practice-oriented approach to the course filling. All material of the discipline is conditionally divided into two parts:

- Mathematical tools of information provision. Elements of set theory, graph theory and the algebra of logic when you deal with information
- The elements of combinatorics, probability theory and mathematical statistics when you deal with information

When the first part of the discipline is developed, it is important to pay attention to the use of different types of mathematical models for school reports. With the development of the second part of the discipline, it is important to pay attention to the use of the information mathematical processing in the educational activities, to the results of educational experiments.

The discipline involves the interaction with educational organizations that implement LLC programs:

- The invitation of teachers to conduct master classes with students
- Joint thematic workshops (debates, conferences, round tables)

In the course of a discipline development, students have to practice the following stages: familiarization, analytical, educational and professional, theoretical and reflective.

In September-November 2014, the module “scientific and mathematical knowledge in educational practice” and MiOMOI discipline program at School No. 9 in Yelabuga were tested. Total 127 students of three faculties at Elabuzhsky Institute (KFU) took part in these tests as future teachers. The analysis of the performed assignments at the introduction to the discipline MiOMOI showed that students do not know how to read a visually presented information, have poor knowledge of information processing probabilistic methods.

The current monitoring was aimed at the identification of labor actions development announced in the program. It was held as the part of the role-playing game “Mathematics in the life of a school day”. Students demonstrated successfully, their abilities to define the schedules of students, to monitor knowledge and attendance.

The landmark control showed the student ability to assess adequately their own achievements, to monitor and to evaluate the educational achievements of students.

Table 4: Education results of labor actions

Labour action	Necessary knowledge and skills	Educational results
Organization and implementation of monitoring and the evaluation of educational achievements, ongoing and final results of the basic education program development	To evaluate the knowledge of students on the basis of testing and other methods of control To use the modern methods of evaluation in terms of information and communication technologies	The monitoring and evaluation of educational achievements, ongoing and final results of the basic education program mastering by students
The development of skills related to information and communication technologies	The knowledge of word editors, spreadsheets, E-mail, multimedia equipment basics The use of digital educational resources	The reading and presentation of statistical data in various forms

During the research and testing, the mechanisms and the means of ability development to the planned labor actions were determined. The specific and tested means, forms and methods of mathematics teaching, the fund of evaluation tools assessment, the created scheme “university-school” networking interaction are of practical importance.

CONCLUSION

The teaching of mathematics in a pedagogical high school is necessary and possible to subordinate to the formation of ability and readiness to labor actions for a future teacher of mathematics.

The prospects for the development of this study may be manifested in the introduction of a projected methodical system of mathematics teaching into the teaching practice at teacher training colleges, the training of mathematics teachers and professors.

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