

THE MODEL OF THE WILLINGNESS OF THE FUTURE MATH TEACHERS TO ENHANCING THE EDUCATIONAL AND COGNITIVE ACTIVITY OF THE STUDENTS

Elmira Ildarovna Fazleeva¹, Nailya Vakifovna Timerbaeva²,

¹Kazan Federal University, N.I. Lobachevsky Institute of Mathematics and Mechanics, e-mail: elmira.fazleeva@mail.ru of ph. 89375293229

²Kazan Federal University, N.I. Lobachevsky Institute of Mathematics and Mechanics

ABSTRACT

Relevance of the problem declared in article is caused by the fact that training of students for the educational and cognitive activity of the students (ECAS) enhancement demands updating of contents, forms and methods of a practical training on profile disciplines and in improvement of programs of all types of educational and pedagogical practices.

The purpose of article consists in development and justification of contents, technology and didactic conditions of training for the future mathematics teachers for ECAS enhancement by which we understand stimulation to creative mastering system of knowledge and ways of activity.

For achievement of the research goals the complex of methods complementing each other was used:

- theoretical (analysis of methodological, pedagogical, psychological, scientific and methodical literature, comparison, generalization);
- empirical (questioning, written poll, conversations, testing, observation, studying of documents pedagogical practice of students of 4-5 courses in 2002-2017). About 1000 students and teachers of department of the theory and technologies of teaching mathematics and informatics of Institute of mathematics and mechanics of N. I. Lobachevsky of the Kazan Federal University (KFU) participated in a research.

The research showed that students experience difficulties not only in enhancement, but also in the ECAS organization. We revealed the pedagogical, personal, subject and psychological reasons of such difficulties.

On the basis of the carried-out analysis the model of future mathematics teachers training which main objective is formation of the competences promoting the solution of problems of ECAS enhancement is developed and pedagogically proved.

Keywords: enhancement of educational cognitive activity of students, student teaching, future mathematics teachers training, preparation model.

INTRODUCTION

Currently the experts with high professional standard that able to estimate adequately own activity and are capable to make independent decisions and to build ways of individual development are in demand [1]. Future teacher fully has to meet the specified requirements.

Future mathematics teachers training at Institute of mathematics and mechanics of N. I. Lobachevsky is carried out within the Teacher of the 21st Century project realized by KFU.

Problems of training of future teachers research both domestic and foreign scientists. One author suggests improving the existing curricula and working programs of the studied disciplines for development of the corresponding competences of future teachers [2, 3, 4, 5]. Others study influence of use of IT technologies

on theoretical and practical training of future teachers [6]. Various models [7, 8] and technologies [9] of training of teachers are developed.

Professional activity of future mathematics teacher develops during mastering programs of disciplines of elementary mathematics, a technique of training in mathematics, implementation of programs educational and pedagogical practice, writing of term and final qualification papers.

In respect of methodical training of future teacher we consider the main interacting training process components: content of training, teaching process - the training activity of the teacher and process of the doctrine - cognitive activity of students [10, 11].

In this regard, our work is directed to creation of didactic model of future mathematics teachers training for enhancement of the educational cognitive activity of students (ECAS).

Modeling can be considered as the leading method of scientific research connecting experimental and theoretical elements and being reception of at the same time educational and forming activity.

Model - the scheme of any phenomenon or object [12]. And the main function of didactic model is reflection and reproduction in simpler type of structure of the multiple-factor phenomenon which direct consideration gives new knowledge of object of studying [13].

Distinguish two types of models: "expert's model" and "preparation model". T. B. Kropocheva considers "the expert's model" as system of the professional, social, creative competences of the personality defining ability to work and achieve the results adequate to requirements of development of modern society, and "preparation model" - as the educational process providing training of students for the solution of professional tasks [14].

The model of future mathematics training teacher is the dynamic system having own contents and structure. The structure has two components: model of educational activity of future teacher and model of the training activity of teachers of university.

The main objective of our research consists in development and justification of contents, technology and didactic conditions of future mathematics teachers training for ECAS enhancement as which we understand stimulation them to creative mastering system of knowledge and ways of activity [15]. We see research problems in correction of subject, forms and methods of classes in elementary mathematics, technique of training in mathematics, and also in improvement of programs of all types' educational and pedagogical practice.

METHODS

For the solution of research problems the complex of the methods complementing each other was used:

- theoretical (analysis of methodological, pedagogical, psychological, scientific and methodical literature, comparison, generalization);

- empirical (questioning, written poll, conversations, testing, observation, studying of documents pedagogical practice of students of 4-5 courses in 2002-2017).

Process of future mathematics training teacher has to be based on modern effective methods of the organization of educational and informative and research activity of students, provide knowledge of internal mechanisms of the doctrine, understanding of how there is in consciousness of the pupil a perception of educational information. Their own activity is necessary for successful formation at students

of necessary competences, ways of thinking and activity that is provided only with active interaction of all participants of educational process. Such interaction is carried out by means of certain methods, receptions and means of the organization of teaching and the doctrine.

For identification of ideas of students of active technologies of training in mathematics, about methods and methods of ECAS enhancement on the second and third courses of pedagogical office of Institute of mathematics and mechanics of KFU questioning was carried out. It was carried out, both to, and after passing educational practice, studying of discipline "A technique of training in mathematics".

RESULTS

Methodical disciplines on the first two courses are not studied therefore, it is obvious that answers of students 2 courses are explained by the intuitive choice and subject experience, preference is given, generally to holding didactic games, the organization of discussions and competitions, use of creative tasks (see fig. 1). It should be noted at the same time that students unilaterally understand activity of the teacher of the UPD organization, allocating only outer side - forms of the organization of training.

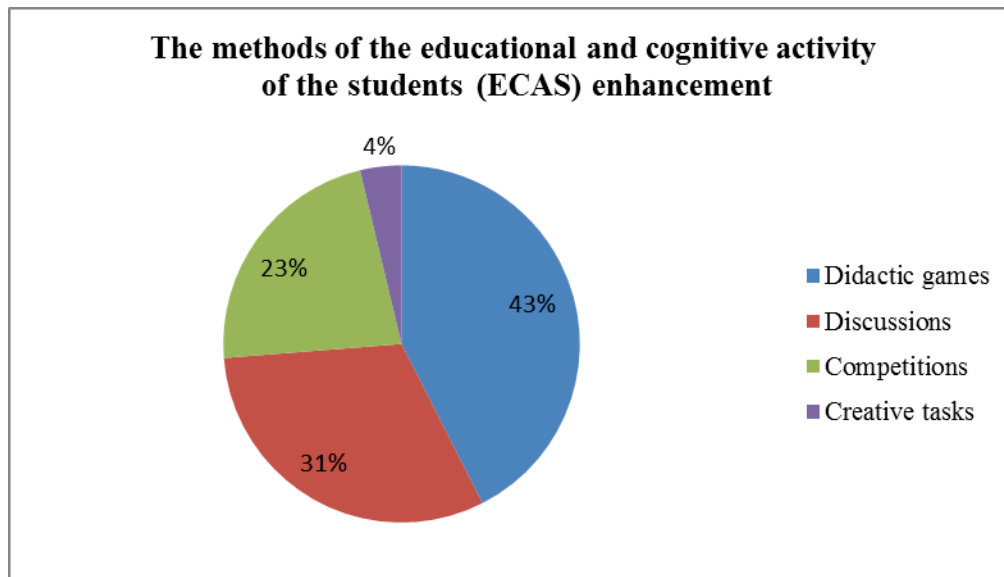


Fig. 1. The methods of enhancement the ECAS
(2nd year students)

The students of a third year who are already studying discipline "A technique of training in mathematics" in the answers to a question of methods and methods of enhancement of cogitative activity of students allocate productive methods of training (problem, algorithmic, heuristic, research, a method of mistakes), performance of creative tasks, the solution of non-standard, historical and entertaining tasks, use of inter-subject communications, holding didactic games, the organization of work in micro-groups, a discussion and discussions, the analysis and introspection of activity, mutual aid, independence in the choice of various level tasks, etc. (see fig. 2).

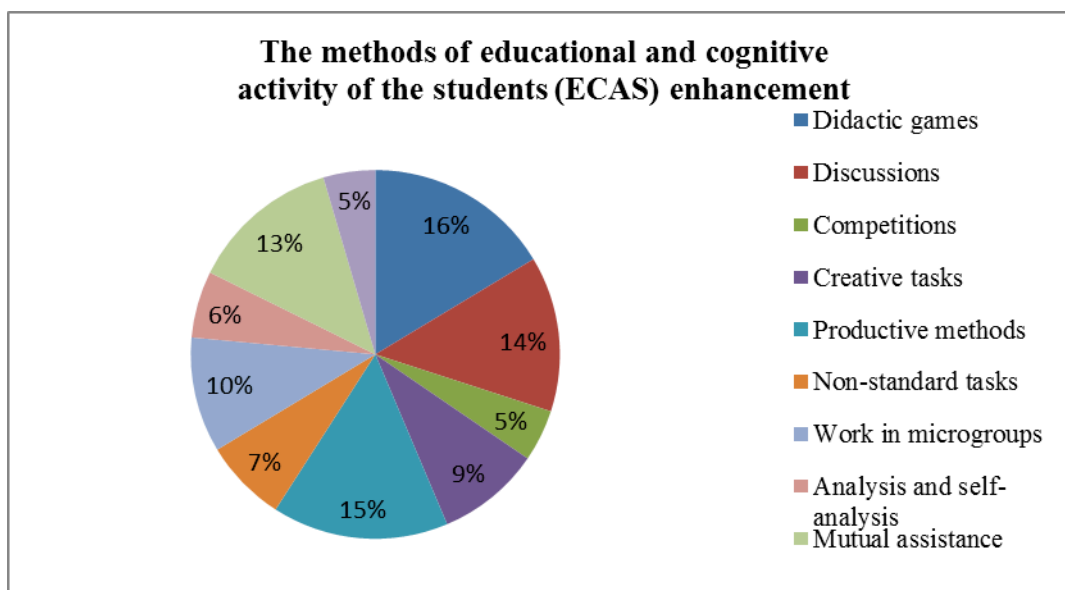


Fig. 2. The methods of enhancement the ECAS

(3rd year students)

Thus, it is possible to notice that if second-year students have only intuitive ideas of methods and methods of ECAS enhancement, then students of a third year are theoretically already familiar with them, but at the same time they have no system knowledge of such methods, receptions and tutorials.

We analyzed also the training activity of students of 4-5 courses when passing of student teaching by them.

At the beginning of student teaching students are faced by an immediate goal - the ECAS organization. For the purpose of detection of ability to organize this activity lessons and "Diaries of student teaching" of 900 students of mathematical faculty of the Tatar state humanitarian and pedagogical university (during the period from 2002 to 2011) and offices of pedagogical education of Institute of mathematics and mechanics of the Kazan federal university were analyzed (during the period from 2012 to 2017).

Students answered the question "What Difficulties in the ECAS Organization You Met?", and teachers-mentors analyzed their activity during practice.

We revealed the pedagogical, personal, subject and psychological reasons of difficulties. Students quite objectively and crucially can estimate own shortcomings, but, at the same time, they see only outer side of the actions, carry out them formally, without feeling internal mechanisms of designing of process of UPD. The aspiration to impose own scenario of a lesson, without objective opportunities of a class prevails. Students are not able to bring students to independent "discovery" of new knowledge and ways of activity, are not able to use obvious "points of problematical character", try to explain everything, hurry to point to a mistake, are not able to see "others" ways of the decision. Use, generally reproductive methods of training, demand only simple copying of the actions, and seldom apply active methods.

CONCLUSIONS

On the basis of the carried-out analysis we developed and pedagogically proved model of future mathematics teachers training which main objective is formation of the competences promoting the solution of problems of ECAS enhancement (see fig. 3). Achievement of a goal is carried out by means of:

- 1) specifications of working programs of disciplines, all types of practices, correction of scope of term and final qualification papers;
- 2) uses of debatable, playful and training ways of training;
- 3) uses of potential of non-standard tasks and creative tasks.

The organizations of any pedagogical process are the cornerstone the all-methodological principles (the principles of democratization, a humanization, differentiation, individualization, etc.). A methodological basis of future mathematics teachers training for ECAS enhancement, the didactic principles assuming are:

- inclusion of students in innovative educational processes that promotes acceptance and judgment of own decisions and actions, and also allows to seize effectively system of educational competences, reaching in the long term levels of pedagogical skill and creativity (the principle of focus on professional and personal development of the student);
- creation of educational process on the basis of use of partial and search, problem, heuristic, design and research methods (the principle of problematical character of training);
- formation of need for independent, creative and reformative mastering system of subject and pedagogical knowledge (principle of informative activity and consciousness);
- creation of steady pedagogical motivation, active use of innovative technologies in educational activity (the principle of a motivational orientation);
- development of self-checking, self-assessment and correction of own activity (principle of reflexivity);
- possibility of the independent choice of ways of self-development (principle of variability and alternativeness of maintenance of pedagogical education).

The main methods of training of students for future professional activity by us determined partial and search, brainstorming, creation of educational projects, interactive training, a method a case-study, etc.

As criteria of readiness of students for ECAS enhancement we chose: motivational and valuable (assessment degree students of the importance of ECAS enhancement, self-assessment of the professional activity) [16]; cognitive (extent of understanding of structure of ECAS, understanding of opportunities of its enhancement); operational (nature of possession of receptions of the organization and ECAS enhancement); reflexive (degree of formation of introspection of professional activity, creative solution of objectives).

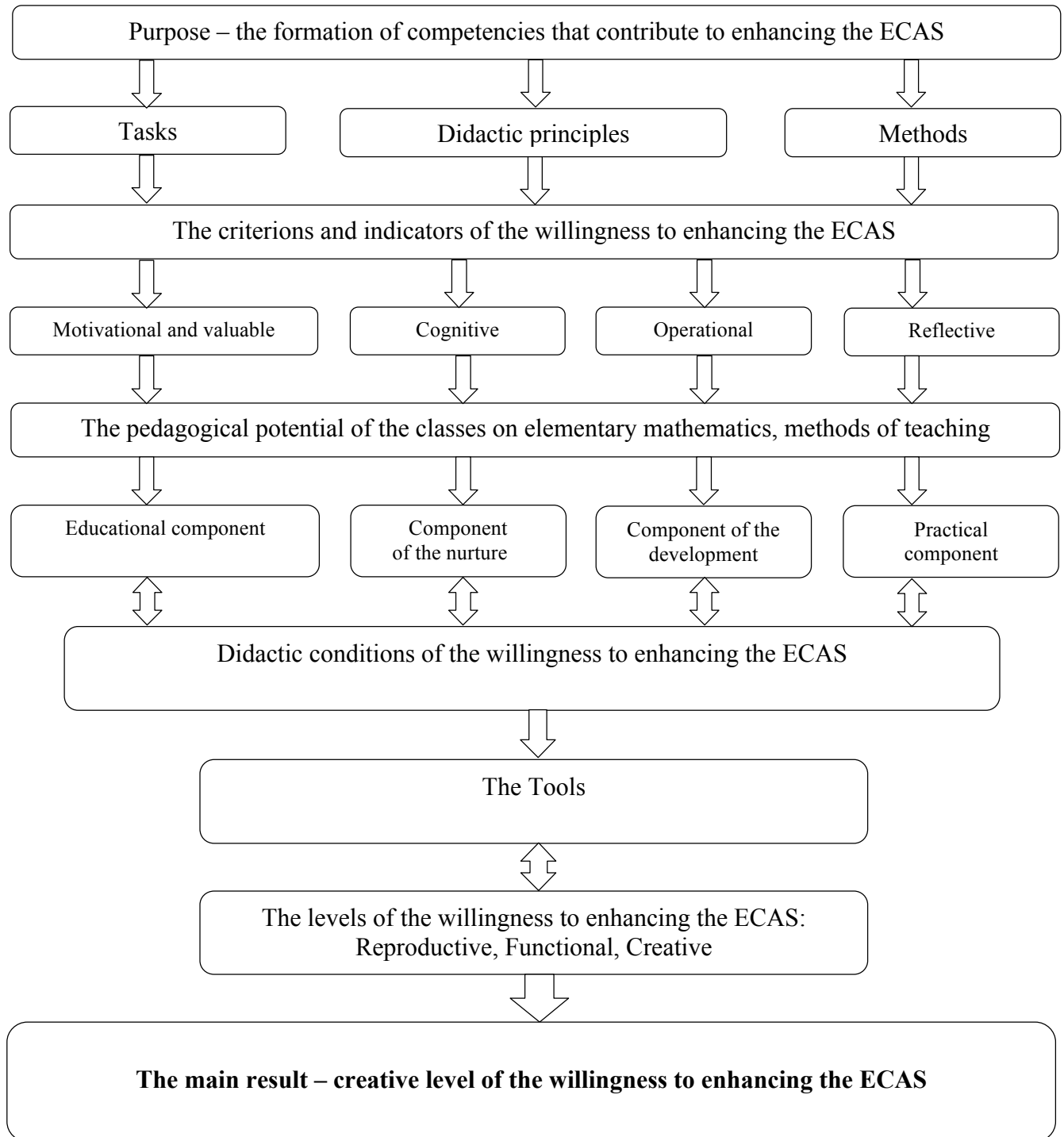


Fig. 3. The model of the willingness of the future math teachers to enhancing the ECAS

Pedagogical potential of classes in elementary mathematics, technique of training in mathematics, educational and pedagogical practice is implemented due to interrelation of the educational, educational, developing and practical components.

We allocated the didactic conditions allowing forming successfully readiness for ECAS enhancement:

- the accounting of need of development of abilities to organize own cognitive activity and ECAS;
- the certain structuring content of profile disciplines allowing to stir up own cognitive activity and ECAS;
- development and use of special system of the educational and informative and problem tasks for students performed in the course of the practical and laboratory researches;
- the organization of the independent educational activity of students in the course of training of MEGOHM directed to formation of readiness for the UPD organization of students;
- arms the students with reflexive mechanisms of creative thinking in the course of mastering of competences, significant in professional activity. Students are offered to develop the creative product for implementation of this condition - a methodical portfolio of future mathematics teacher.

We determined levels of readiness of future mathematics teachers for ECAS enhancement: reproductive (nobility) is assumed by ability to analyze and use ready developments of lessons; functional (to be able) means ability to organize process of ECAS at separate stages of a lesson; creative (to own) means readiness for ECAS enhancement. At the first level it is supposed on suggested by teachers to algorithms of creation of various stages of a lesson to make abstracts and to conduct lessons; to use a case technology. At the second level students have to use the recommendations about enhancement of educational cognitive activity of students connected with some structural elements of mathematical contents (for example, to motivate introduction of the new term with a support on the intrinsic characteristic of the studied concept; to consistently bring students to a new way of actions; to teach to make mathematical models of solvable tasks, etc.). The third level provides independent mastering future teacher system of scientific knowledge and ways of ECAS enhancement.

SUMMARY

We see the end result of our research in leading of students to the creative level of readiness for enhancement of educational cognitive activity of students. According to it also tools of the presented model will be to be improved.

ACKNOWLEDGEMENTS

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

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