

The formation of future teachers' professional competency

S. A. Skvortsova^{1*}, Y. S. Gaevets¹, Y. S. Vtornikova²

¹South Ukrainian National Pedagogical University named after K.D. Ushynsky, Odessa, Ukraine

²Odessa National Maritime University, Odessa, Ukraine

*Corresponding author. E-mail: skvo08@i.ua

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Abstract. The paper presents the author's model of formation of primary school teachers' methodical competency to teach pupils Mathematics. Based on the National Qualifications Framework the result of learning at every educational level is a competency; scholars identify a methodical competency as a part of teacher's professional competency; the formation of a methodical competency is a goal of the presented model. To achieve this goal means to implement the methodical system, presented as a composition of interrelated and interconnected components: tasks, educational and informative resource (training content and organizational forms of training), technologies and learning tools.

Keywords: *primary school teacher, methodical competency, teaching Mathematics, formation of methodical competency.*

The modern stage of development of school education of Ukraine is characterized by the introduction of the State standards of new generation, by the realization of the new competency-oriented educational programs. The situation is rapidly developing and requires from teachers a high level of professional and methodical competency, which is expressed in readiness and ability to estimate the offered changes of standards and programs from the point of view of their expediency for the achievement of the given goals, and also to put them into reality of teaching the subject, obtaining the results declared in normative documents. Meantime, as practice shows, teachers hardly ever participate in the discussions of such documents, and then explain their own failures by insufficient quality of documents and bad textbooks. There is a contest for the textbooks for the fourth and seventh grades in Ukraine now – there is a link to demo versions on the website of the Ministry of Education and Science of Ukraine (sixty pages each textbook), that passed to the second round of the contest. Now teachers, having acquainted with the layout of a textbook in a subject, after reviewing the conclusions of experts, teachers, Methodists and scientists, have the opportunity to choose independently the book that satisfies their needs. Thus, school of today needs an active, competent teacher, who is able to make independent decisions, forming of such a teacher is the aim of professional education in higher educational establishment.

Based on the normative documents such as National qualifications framework of Ukraine, State standards of general, primary and secondary education, we define the competency as the ability of a person to perform certain type of activity, which is expressed through knowledge, understanding, skills, values and other personal qualities, purchased and demonstrated after graduation. Competences – as a socially significant result of education, are a basis, the internal reserve of competency. The basis of competences constitutes knowledge, abilities, skills and also the experience of the relevant activity. On this basis the competency can be seen as the ability to demonstrate the possession of a certain competence in real practical activities. Thus, the competency is the system of mutual relations of the acquired knowledge, abilities, skills and the ability to use them effectively for solving standard and problematic situations that arise in a person's life.

The analysis of scientific works on the problem of professional competency of teacher in the works of domestic

and foreign scientists is presented in the monographs of I. Akulenko [1, p. 228-229], N. Gluzman [2, p. 75-96], O. Matyash [3, p. 106-109], S. Skvortsova and Y. Vtornikova [5, p. 76-101]. We interpret the professional competency of a teacher as a property of personality to organize the educational process at the level of modern requirements; as the unity of theoretical and practical readiness of a teacher (subject-theoretical, psycho-pedagogical and didactic-methodical) for performing his/her activity; as the ability to act productively; to decide effectively standard and problem situations, which arise in the process of education of schoolchildren.

Due to the fact that the competency is a complex personal formation, most of scientists in this pedagogical phenomenon highlight individual groups, based on either informative, or activity, or personal components. In our research, along with the approaches of European, American, Russian and Ukrainian scientists, the structure of professional competency of a teacher is worked out as a composition of such components as professional-activity (social, contextual, subject, informative components), personal (personal, integrative, reflective, creative and adaptive components), and communicative (communicative, socio-cultural components). Along with this, we consider professional competency as a composition of key, basic and specific competences. The key competencies are the base of all the components of professional competency of teacher, they must be inherent to the representatives of any profession for effective life in the surrounding world, the basic competencies – to the representatives of profession of teacher, and special – to the teachers of certain object. Thus, each component of professional competency of teachers is manifested in the key, basic and special level, the key is the foundation on which rests the base, and then a special level – the level of the special competencies. With maintenance of the presented structure of professional competency of teacher you can acquaint in the author's work [5, p. 91-101].

In the structure of teacher's professional competency, in its professional-activity component, on a special level, one of the main places takes methodical competency. The problem of the essence of methodical competency of teacher to teach Mathematics to schoolchildren were studied by leading scientists: I. Akulenko, N. Gluzman, L. Koval, A. Kuzminski, E. Lodatko, I. Malova, A. Matyash, V. Motorina, S. Semenets, N. Tarasenkova etc. In the methodical competency (MC) in our research we under-

stand the individual property, which manifests in the ability to efficiently solve standard and problematic methodical tasks, that are based on theoretical and practical readiness to conduct classes for different training sets.

The methodical competences consider as a socially important outcome of teacher's education; as a basis, internal reserve of methodical competency, which is based on subject-scientific, didactic-methodical and psychological knowledge, on the skills to solve methodical tasks, of experience of teaching the subject and emotionally-valuable relation to this process.

The methodical competency of a teacher is an integrated multi-level professional feature of his personality. For defining this concept, scientists come running to the consideration of the structure of methodical competency.

The structure of methodical competency of teachers is presented as a composition of components: regulatory, variation, special-methodic, technological, control-estimating and project-designing. Backbone in the hierarchy in relation to regulatory, variation, control-estimating and project-designing and technological competences is a specially-methodological competency; and managing regulatory competence directs the activities of a teacher in achieving the goals and objectives of the study defined in the regulations.

Formation of methodical competency of future teachers takes place through the development of student competences, which are the internal provision of the individual components of methodical competency: normative variable, especially methodological, technological, projective simulation, control and evaluation. In the formation of methodical competency has a complex structure and contains motivational evaluative, cognitive, activity and reflective-creative components.

The goal of this article is to present a model of formation of methodical competency of future teachers by means of the discipline "Methods of teaching mathematics".

Methodical competency in teaching students mathematics is formed at the future teachers in the process of mastering their academic discipline "Methods of teaching mathematics". The content of the discipline is determined on the basis of system abilities representing qualified requirements presented in the Industry standard, namely in the educational and qualification level (EQL).

On the basis of the EQL, as well as the contemporary realities of the practice of teaching Mathematics at school, with the purpose of formation of methodical competency of teachers it is necessary to design the expected result in the creation of an appropriate fragment of the model of the graduate, which presents the list and the expected level of components of methodical competency of teachers in teaching students mathematics, their inner reserve of competencies, the basis of which are the knowledge, skills, experience and emotional-value attitude in it. The creation of a fragment of the model of a graduate is based on the structure of methodical competency of teachers in teaching the subject constitutes one of the conditions of increase of efficiency of process of formation of methodical competency of future teachers in teaching students mathematics.

On the basis of a fragment of a graduate's model, with the aim of ensuring the formation of all components of the

methodical competency should be developed the program of the discipline "Methods of teaching Mathematics". In the program of educational discipline should be allocated to the list and to determine the level of competencies that are formed in students because of studying an entire course, because of studying a single module. Through such representation, it is possible to trace the dynamics of the process of formation of methodical competency from module to module; if desired, the teacher can make a map of competences. This provides the second condition of increase of efficiency of formation of methodical competency of future teachers - development of competency-oriented program of discipline "Methods of teaching Mathematics".

In the regulatory program of the discipline "Methods of teaching Mathematics», it is necessary to consider the realities of modern stage of development of education and send it to the following tasks: familiarize students with the goals, objectives, content and features of construction of mathematics. Normative documents that should guide the teaching of mathematics textbooks that have the stamp of MES of Ukraine, methodical training topics, the relevant content areas of the State standard of the educational field "Mathematics", with differences in the study of selected topics in different teaching sets; the structure of the mathematics lesson. One of the tasks of the discipline is the formation of students readiness to use knowledge, methods of teaching individual aspects of the program, resulting from the ability to develop the system of learning objectives in preparation for the introduction of new material, for reading and for the formation of mathematical skills in real mathematics lessons for any teaching course.

These objectives are formulated based on methodical competency, they determine the content of methodical system of formation of methodical competency of future teachers in the teaching of mathematics. Each content module solves a separate problem for the formation of components of methodical competency of future teachers in teaching students mathematics. For example, usually the course starts with modules, the purpose of which is to review the regulatory framework for the education, the course content of mathematics, its construction, the conceptual foundations and characteristic features of modern mathematics lesson built on technological grounds. On the basis of this material, the process of formation of readiness to use regulatory documents, the ability to implement the goals and objectives of teaching Mathematics at school (the normative component of MC) are being formed at students. Students have the opportunity to trace the appliance of modern educational technologies at Mathematics lessons (the technological component of MC).

Most of the content modules are devoted to the methods of teaching students certain substantive lines of the State standard. In the process of mastering modules, the formation of the regulatory constituent of the MC is continued, but a specially-methodical constituent of the MC is in the center of attention. While mastering the technique of teaching students specific issues of Mathematics course, future teachers analyze current textbooks on Mathematics, and compare methodological approaches implemented in them, determine the most effective for the

implementation of the State requirements for the comprehensive training of students, determined by the curriculum for the particular year of study (variation constituent of the MC), and on the basis of the indicative criteria of evaluation of educational achievements of students, they learn to evaluate the results and to give marks (control and evaluation constituent of the MC).

The culmination in mastering each module is that students-future primary school teachers-have to create projects (abstracts) of lessons or training educational systems tasks based on specific issue of the program, and thus there is a formation of projective modeling constituent of the MC. To create this project students must have a good understanding of the regulatory requirements for the content and results of the study subjects (normative constituent of the MC), methodological approaches to it's studies (specially-methodical constituent of the MC), the content of training in current textbooks for the purpose of selection of textbooks, which, to the greatest extent, gives an opportunity to implement the State requirements for the comprehensive training of students (variation constituent of the MC), the content of modern educational technologies with the aim of assessing their possible applications in their own project (technological constituent of the MC)

Thus, the content of methodical system is aimed at the formation of future teachers' components of methodical competency in teaching students Mathematics, and therefore is an internal reserve of obtaining this certain property.

Mastering of the academic discipline 'Mathematics teaching methods' takes place during lectures, practical and laboratory trainings, during individual work and individual research assignment (IRA) in the form of training projects and serves as preparation for educational practice, during which future teachers apply methodical knowledge practically, skills and experience gained during practical, laboratory trainings and fulfillment of training projects

Discipline teaching methods (DTM) include texts and/or plans of lectures and practical trainings, tasks for individual work and means of verifications (tests and/or texts). DTM also include means of teaching, i.e. textbooks and training manuals both on paper and on electronic media, all kinds of multimedia tools (presentations of lectures, interactive tutorials, test online, a compilation of video lessons, websites, etc.), which means formation of methodical competency of future teachers in teaching mathematics.

For achieving the goal – formation of future teachers' methodical competency in teaching Math – lectures, practical classes should be arranged in accordance with modern teaching technology. Nowadays, it is obvious for the majority of scientists and university professors that a lecture is to include a problem; it is obvious that with the purpose of formation of methodical competency, both at lectures and practical lessons, it is advisable to use the technology of contextual training, because this technology allows to model the content of the future professional activity. Practical lesson plans must provide not only solving teaching and situational problems (situational training), but also include the discussion and the imitation of fragments of lessons or working procedures on indi-

vidual tasks (online training). At practical trainings, it is advisable to take the time to present the results of a student INDVT (project technology).

Thus, the problem learning technology is a leading one at lectures, at practical trainings - contextual, situational and interactive learning, during independent work and INDVT - context and project learning. It should be noted that at the present stage of development of High School, the lecture is accompanied by a presentation, which makes it possible to structure the academic content, to visualize it through animated lessons; videos illustrate some of the provisions of fragments of lessons, hyperlinks to relevant regulatory documents and literary sources, etc. During the individual work students should not only use presentations of the lectures, but also video lectures, interactive tutorials, structured in such a way that the student has the opportunity to master academic content through hyperlinks, at the appropriate level to his individual abilities and needs. Thus, the modern educational process cannot be imagined without the introduction of information technologies, including the Internet.

Therefore, the formation of methodical competency of future teacher requires the use of modern technologies of students training, focused on a competency approach. On this basis, we developed a dynamic model of formation of teacher's methodical competency that specifies the composition of technologies and used at lectures, practical classes, independent work of students, during creating educational projects. According to this model, problematic, situational, online learning and IT-technology are used at lectures. At practical (laboratory), training contextual, situational, interactive learning and IT-technology are used. During students' independent work, contextual, situational, learning and IT-technology are used. It should be mentioned that in the presented model the impact of each type of work on the components of methodical competency is determined.

Thus, the following condition for raising the efficiency of formation of teacher's methodical competency is the implementation of technology into the learning process, activating the educational-cognitive activity of students, modeling future professional activities, and hence the methods, means and forms of work, being realized within these technologies. The usage of the technologies of problem, project, interactive, situational and contextual education supposes designing of problem educational process by a teacher, using training methods simulating a content of teacher's professional activity; the designing of class activity of students as a gradual independent work that is aimed at solving problem situations in conditions of group dialogic discussion involving teacher; personal student's including into educational activity.

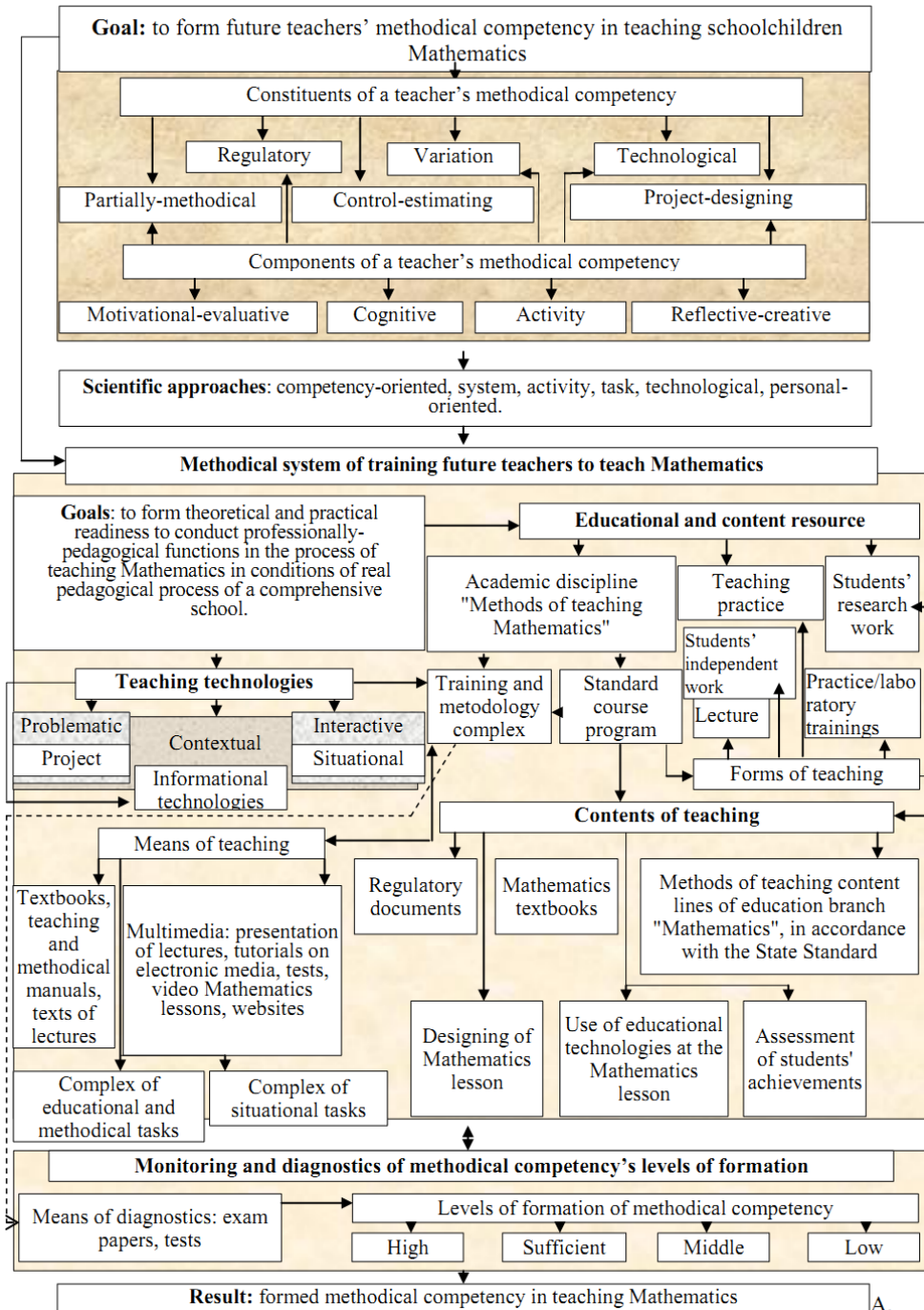
In the process of mastering the content modules of the academic discipline "Methods of teaching Mathematics", the constant monitoring of formation of certain MC components is to be conducted by using certain methods of control – quizzes, exams and tests. Naturally, Math training methods can not be represented in the form of closed testing exercises but for the constant monitoring of the process of certain MC components' formation it is appropriate to create texts using computer technologies. Obviously, on-line testing allows reduce the presence of competences on the I-II levels (recognition, knowledge and

understanding). Possibility of using (III level) and analysis, synthesis, comparison, checking and appraisalment (IV level) can be checked only through examination papers or educational project.

The monitoring of formation of certain MC components performs the functions of fixation relevant statute, extent and level of adoption methodical competences (which appears as internal reserve of methodical compe-

tency). It also performs activities of identifying compliances of the relevant statute of MC with forecasts, definition the strategies of development of future students' MC. The form of final control of the results of mastering the academic discipline is an exam. Exam's results and other forms of control allow to make a conclusion about the level of MC formation for every separate student.

Model of formation of primary school teachers' methodical competency to teach pupils Mathematics



Motivational, content, and operational criteria are chosen to characterize levels of MC formation. Motivational criterion characterizes the level of future teacher's formation of motive, aspiration to accomplish perfect professional activities in teaching Math, interest to professional activities, pursuance of professional advancement and

creativity in teaching Math. Content criterion characterizes the degree of future teachers' mastering the methodical knowledge in teaching Math. Operational and activity criterion characterizes the level of mastering the system of methodical abilities which is necessary for successful Math teaching. The skills to design and project Math

lessons, to use modern pedagogic technologies and implement the innovational approaches of teaching Math.

According to the components of teacher's methodical competency in Math teaching, the given criteria are projected into a complex of indicators that give the opportunity to detail their specific displays and to characterize the level of the formation of future teachers' methodical competency in Math teaching. It is possible to choose the way of definition of level formation of separate components of methodical competency and then to define the MC level on this base. For each of these MC components the index of motivational criterion is "motivation", for content one – "knowledge" and for operational and activity one – "abilities". We formulated four levels of MC formation: high level, sufficient level, medium level and low level.

Students with sufficient level demonstrate the full and generalized knowledge of methodic and the ability of implementing it. They show stable aspiration in effective Math teaching of pupils. The partial mastering of methodic of Math teaching is peculiar to students with the medium level; their ability to implement all the received knowledge not fully are realized and generalized, they are able to work only following the sample. Superficial skill and knowledge, that are insufficient for effective professional activity, absence of aspiration in receiving good results in teaching Math, demonstrate the students with the low level.

The high level of MC formation is characterized by a creative approach to Math teaching, capability to create

innovative methodic approaches. This level can be reached by a little number of teachers and in the end of their professional career. Naturally, that is why this level can not be found out among students – future teachers.

Thus, the condition, which consists of continuous monitoring of formation of future teacher's methodical competency in Math teaching, is being realized.

The realization of the conditions, presented above, is possible by means of the developed model of formation of future teacher's methodical competency in teaching Math.

Conclusions. The formation of future teachers' methodical competency in teaching Math must be directed to formation of separate components of methodical competency: regulatory, variation, special-methodic, technological, control-estimating and project-designing, which must be considered in the content of the academic discipline "Methods of teaching Mathematics". This academic discipline is mastered through lectures, practical trainings, laboratory trainings and independent work. Development and realization of them must take account of modern educational technologies: context, problem, project, situational and interactive learning, and provide usage of informational technologies, multimedia resources of education. Implementation of the developed model of MC formation, based on the methodical training system of future teachers for teaching Math, creates necessary conditions for forming methodical competency in teaching Math among students – future teachers.

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Формирование профессиональной компетентности будущих учителей.

С. А. Скворцова, Я. С. Гаец, Ю. С. Вторникова.

Аннотация. В статье презентована авторская модель формирования методической компетентности будущих учителей начальной школы в обучении учащихся математике. Исходя из Национальной рамки квалификаций, результатом обучения на каждом образовательном уровне является компетентность; в составе профессиональной компетентности учителя ученые выделяют методическую компетентность, формирование которой и определяет цель презентованной модели. Ее достижение осуществляется за счет внедрения методической системы, которая представляется как композиция взаимообусловленных и взаимосвязанных компонентов: задач, учебно-содержательного ресурса (содержание обучения и организационные формы обучения), технологий и средств обучения.

Ключевые слова: учитель начальной школы, методическая компетентность, обучение математике, формирование методической компетентности.