

ПРОФЕССИОНАЛЬНО-МЕТОДИЧЕСКАЯ ПОДГОТОВКА УЧИТЕЛЕЙ ИНФОРМАТИКИ В УЧРЕЖДЕНИЯХ ВЫСШЕГО ОБРАЗОВАНИЯ

PROFESSIONAL AND METHODOLOGICAL TRAINING OF COMPUTER SCIENCE TEACHERS IN HIGHER-EDUCATION INSTITUTIONS

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Обосновано внимание к профессионально-методической подготовке будущих учителей информатики, направленной на формирование компетентных в своей предметной области специалистов, способных на высоком уровне организовывать процесс изучения предмета «Информатика» в учреждениях общего среднего образования, готовых предлагать нестандартные идеи для решения комплексных проблем в профессиональной деятельности, интегрировать в образовательную среду программные средства, современные сервисы и ресурсы, информационно-коммуникационные технологии. Профессионально-методическая подготовка будущего учителя описана как обучение (специально организованный процесс приобретения знаний, умений и навыков, первоначального опыта деятельности по выбранной специальности) и как результат (овладение методической компетентностью, которая интегрирует предметную, психолого-педагогическую, технологическую, методическую осведомленности и профессионально значимые личностные качества специалиста).

Ключевые слова: профессионально-методическая подготовка, информатика, методическая компетентность, обучение, информационно-коммуникационные технологии.

The article substantiates the attention to professional-methodical training of future informatics teachers directed to forming competent specialists who are able on a high level to organize the process of studying the subject "Informatics" in establishments of general secondary education, ready to suggest non-standard ideas for solving complex problems in professional activity, to integrate program facilities, modern services and resources, informational-communicational technologies into educational environment. Professional-methodical training of a future teacher is described as teaching (specially organized process of obtaining knowledge and skills, primary experience of activity in the chosen sphere) and as a result (mastering methodical competence which integrates subject, psychological-pedagogical, technological, methodical knowledge and professionally significant personal qualities of a specialist).

Keywords: professional-methodical training, informatics, methodical competence, teaching, informational-communicational technologies.

Introduction. The process of updating the content of secondary education, characterized by numerous innovations, requires teachers who are competent, proactive, creative and mobile, able to innovate while maintaining the positive achievements of the past, ready for personal and professional growth. The orientation of society to a new type of pedagogical thinking increases the requirements for the organization of the educational process in higher-education institutions (hereinafter – HEI), shifting the emphasis from the learning process to learning outcomes.

Higher pedagogical education should become more fundamental, flexible, and applied, focusing on how to teach future teachers to think, generate non-standard ideas, find effective solutions, and improve themselves. That is why the attention to the professional (methodical included) training of future teachers is increasing, so as the practical significance of the results of their training in the HEI.

The main body. The basis of changes in modern education is a competency-based approach, which focuses on the formation and development of students' general and professional competencies. The competence of a specialist as a result of his training in HEI reflects the acquired knowledge as understanding (theoretical awareness, ability to know and understand), activity (willingness to apply

knowledge in specific practical situations), existence (formation of personal and professional values).

The professional training of future teachers of computer science, the essence of competencies that students must master as teachers have been studied by many scientists, including M. M. Abdurazakov, V. Yu. Bykov, L. V. Breskina, I. S. Voitovich, O. M. Goncharova, M. I. Zhaldak, N. V. Morse, K. P. Osadcha, S. A. Rakov, Yu. S. Ramsky, S. O. Semerikov, E. M. Smirnova-Tribulskaia, O. M. Spirin. In the circle of scientific discussion, the urgency of questions concerning professional and methodical training of the bachelors who qualify "the teacher of computer science" grows.

Training of students in the educational program «Secondary Education (Computer Science)» is aimed at training competent in their subject area professionals who can organize the educational process of the school course of computer science at the level of modern requirements, ready to offer non-standard ideas for solving pedagogical problems, master the software, programming languages and information technologies, and adequately use them in own activity. That is why students must, first of all, acquire fundamental knowledge of computer science, which goes beyond the school course. Undoubtedly, such training cannot be carried out in isolation from the future professional ac-

tivity and therefore students need to master the methods of teaching a school course of computer science at different stages of education in HEI, for example, to highlight methodological aspects in studying basic sciences, pedagogical practices, writing term papers and diploma projects.

Teacher qualification is described by such a category as «professional competence», which is represented by a set of key (solving typical pedagogical problems), basic (reflecting the activities of the profession) and special (emphasizing the uniqueness of the subject area) competencies. On the other hand, we distinguish in the structure of professional competence of teachers the methodological competence, mastery of which is the basis of successful pedagogical activities for the processes of teaching and learning students in a particular subject.

Domestic science has not developed a single approach to describing the content of the concept of «methodological competence» yet. Scientists interpret its essence and structure differently, outline differences in the directions of formation and further development.

Methodical competence of a teacher, according to O. S. Fesenko, is «a set of his methodological knowledge, skills, abilities, individual and personal qualities, which functions like the ability to explore, adapt, organize, direct and control educational, cognitive, educational and developmental aspects of education» [1, p. 36]. The basis of the specialist's competence is his scientific-theoretical and subject-methodical knowledge, as well as the ability to perform methodological activities for designing, constructing, and organizing the learning process and manage it, evaluating the results of their actions and academic achievements, forming information-educated personality.

M. M. Abdurazakov identifies the methodological competence of a computer science teacher with a detailed system of knowledge and skills in the methodology of teaching computer science, in which psychological and pedagogical knowledge is basic, and methodological knowledge is practice-oriented [2, p. 11]. The scientist explains this position by the fact that a teacher who has only subject knowledge in computer science can not teach the younger generation, for example, to carry out project activities, plan learning outcomes and compare them with real achievements, outline techniques for learning new based on individual and differentiated learning. Relevant aspects of higher pedagogical education are the acquisition by students not only of knowledge but also of ways to apply them in practice, as well as mastering the experience of the speciality, for example, developing pedagogically appropriate and balanced software to study a certain content line of school computer science course.

In turn, A. M. Kuch explores the methodological competence of the teacher in a combination of basic (knowledge of professional terminology, ba-

sics of planning and organization of training, selection of tools and teaching methods) and special (mastering the methods of teaching certain issues) components [3, p. 191].

According to IV Kuznetsova, the methodological competence of the teacher characterizes his ability and willingness to use subject knowledge and skills in the field of teaching methods; to model and design his methodical activity; self-improvement [4, p. 80]. For a deeper disclosure of the content of competence, the scientist identifies its functional components, including:

- acmeological (achievement of professional maturity in the context of personal development);
- prognostic (determination of forms and methods of teaching, design of expected results, processing of educational information);
- innovative (performance of problem-search, reflective-analytical and other types of activities);
- integrative (combination of methodological, psychological-pedagogical, and subject knowledge and skills);
- regulatory (regulation of communication between teacher and students);
- reflexive (self-analysis and self-assessment of own pedagogical activity).

The above-mentioned components in the professional and methodological training of future teachers are interconnected, interdependent, and are based on personality-oriented, activity, and other paradigms of learning. The combination of these components allows students, for example: to analyse the best pedagogical achievements in the methodology of teaching the subject and integrate them into their practice concerning academic integrity; to deepen the formed psychological-pedagogical, technological and subject knowledge; to form skills of application of modern means and technologies of training; to reflect on the activities of all participants in the educational process; be aware of the value attitude to the results of their activities and strive to purposefully improve them during further training.

V. G. Motorina explores the subject-methodical competence of the teacher as an integrative quality of personality, which is manifested in the methodical and subject orientation, involves the mastery of professional-technological skills and critical thinking [5, p. 21]. The highest level of professional and methodological training of future teachers is the accumulation of initial experience in the speciality, development of their methods of teaching the subject and its discussion at the professional level, willingness to update subject knowledge and restructure their methods of activity.

Methodological competence is a professional and personal characteristic of a teacher, which is manifested during the performance of official duties and the achievement of significant results in methodological activities. Revealing the content of methodological competence, it is advisable to

operate with such factors as knowledge of the content of education (regulations, curricula, textbooks); awareness of teaching methods and related fields of knowledge (guidelines); ability to design and create educational and didactic materials and use them comprehensively; cognitive and creative activity, awareness of the importance of their educational achievements.

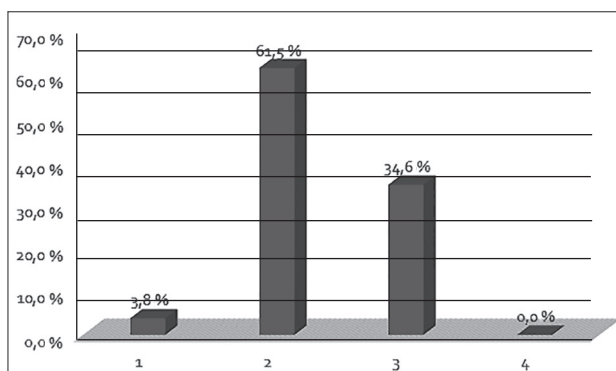
This opinion is confirmed by the answers of 4th-year students of Rivne State University of the Humanities to the following questions:

- indicate what forms of work should be used during classes on methods of teaching computer science (Fig. 1(a));
- indicate which of the following characteristics reveals the essence of your methodological competence as a future teacher of computer science (Fig. 1(b)).

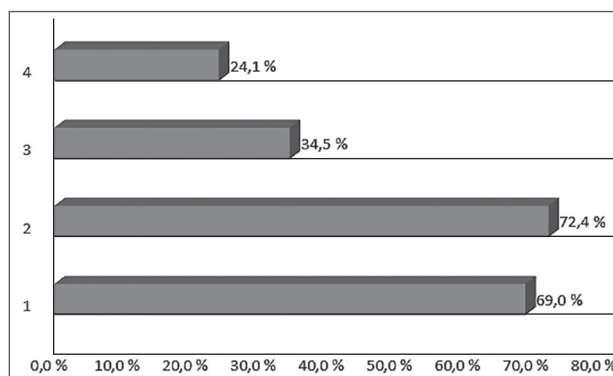
The answers of 26 students to the first question were as follows: almost 62 % of respondents preferred to solve practical problems compared to the study of theoretical material; 35 % – would like to study theoretical descriptions and solve practi-

cal problems in equal proportions of allotted time; almost 4 % of students are ready to perform only practical tasks and none of the respondents chose the answer – «more theoretical descriptions, less practical tasks». We see the solution of this situation in the relationship of theory with practice and describe the educational and cognitive activities of the student as a rational combination of lectures with practical and laboratory classes.

The second question was answered by 29 students and their answers are as follows: 69 % of respondents identify the formation of methodological competence with the result of theoretical and practical professional and methodological training; 72 % of bachelors describe methodological competence through a combination of pedagogical knowledge and knowledge from the school course of computer science; The answer «thorough basic knowledge of computer science as a science and as a school subject» was chosen by 35 %, and only 24 % of students believe that the content of their methodological competence reveals the fundamental knowledge of computer science.



a)



b)

Fig. 1. – The results of a survey of students

It should be noted, that during the implementation of various types (educational, cognitive, research, pedagogical, research) of activities, bachelors must analyse and evaluate their achievements not only from the position of the student but also from the position of the teacher. The acquisition of methodological competence during higher education is carried out both in theoretical and practical terms at a certain level, the increase of which is carried out during professional activity in secondary schools after the student has obtained the qualification of «computer science teacher». It should be noted that during the training in HEI, the formation of methodological competence begins, and its further development occurs after obtaining the appropriate qualification, during professional activity in secondary schools, expanding one's pedagogical experience, building a professional career, self-improvement and self-development.

Describing the long-term process of mastering methodological competence, which involves orderly and time-organized communication between participants in the educational process, I. A. Akulenko identifies the following stages:

- initial formation (unconscious on the part of the student accumulation of acquisitions in the components of competence);
- formation (purposeful on the part of the teacher, but not sufficiently conscious on the part of the student mastery of acquisitions in the components of competence);
- primary functioning (teacher-led, conscious and purposeful accumulation of subjective experience by the student);
- development (a student-conscious process of accumulation of subjective experience and its adjustment) [6, p. 62].

The basis for the formation of methodological competence of the future teacher is the formation of skills and abilities in solving problems (for example, in standard situations, in changed conditions), which model the methodological activities of computer science teachers to organize educational, cognitive, reflective and creative activities of students in computer science lessons of different types, for example:

- construction of the educational process according to different curricula and for different forms of education; definition of the purposes of stu-

- dying of a concrete theme, selection of the corresponding means and methods of training; search for new teaching methods and their implementation in the educational process; formulation of goals and objectives following the age and individual characteristics of students;
- study of the use of ICT at different stages of the educational process and all its participants;
 - planning of the educational process: organization of students' work with a computer and appropriate software; designing educational situations taking into account the specifics of the subject; selection of methods of activity for work with separate methodical objects; forecasting different types of educational and cognitive activities of students;
 - management of educational and cognitive activities of students, expanding their cognitive interest in the study of computer science and mastering ICT; organization of individual and group work of students in online and offline modes taking into account their age features; developing a trajectory of work with gifted students; demonstration of interdisciplinary links in the study of specific topics;
 - assessment of students' activities and learning outcomes; differentiation of requirements to the results of assimilation of educational

material by students; development of test tasks using computer testing;

- evaluation of own activity; analysis of the lesson taking into account its place in the system of lessons, the purposes of its carrying out and features of educational material; generalization of the obtained results in the form of own method of studying the subject;
- consulting experts in other fields on education and ICT skills.

Methodological competence of a teacher is a dynamic and multilevel formation, the mastery of which is long in time, so its components must be reflected at all stages of student learning in HEI, following the sequence: general scientific training – subject awareness – psychological-pedagogical and technological training – knowledge of teaching methods subject and related industries. The individual connections and components of the described sequence are shown in Fig. 2, which systematizes the list of disciplines studied by future teachers of computer science following the course of study in HEI. Experience shows that in such a sequence it is necessary to present not only the fundamental–subject component and the cycle of psychological-pedagogical and methodological disciplines, but also to look for forms of their various integration.

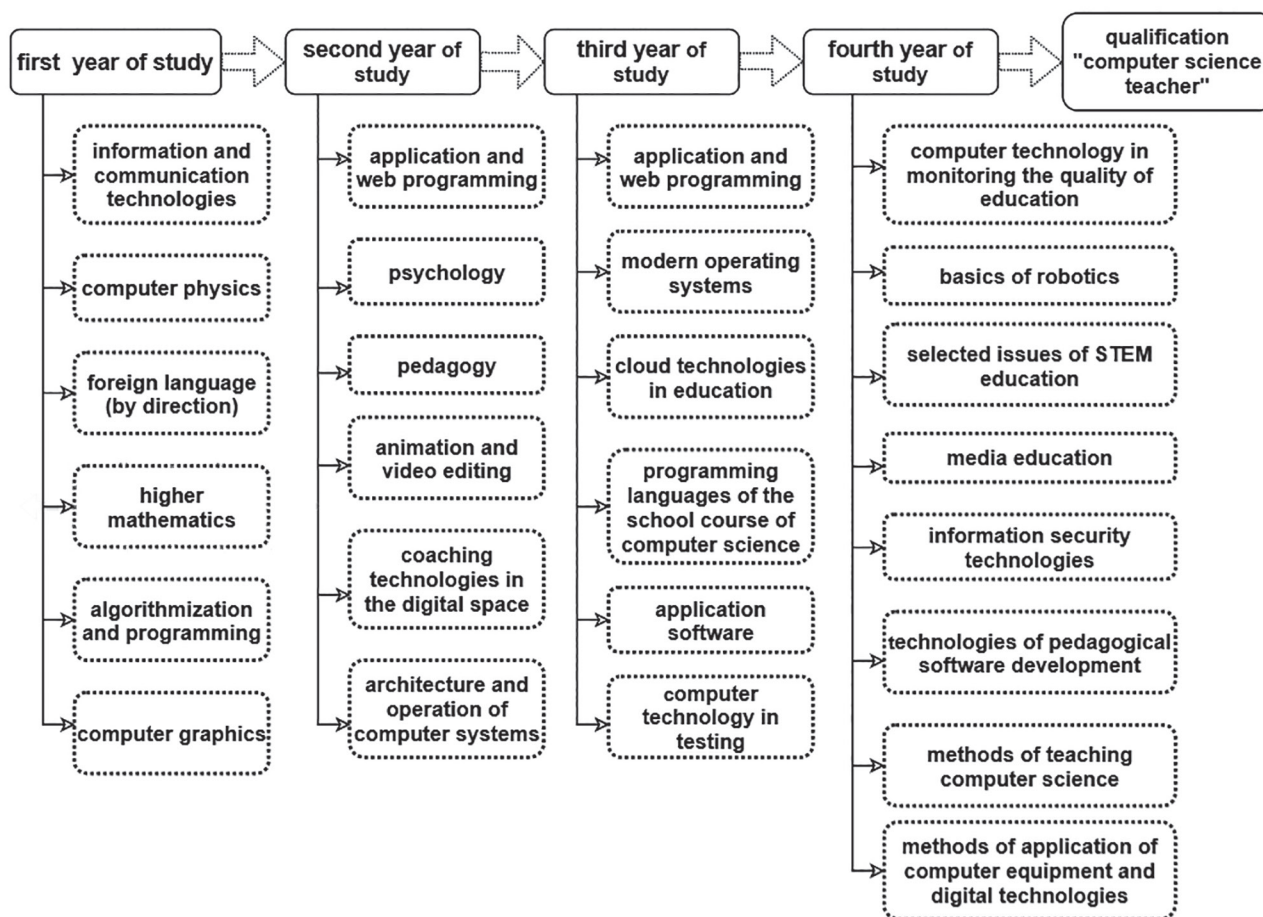


Fig. 2. – Fragment of the educational program «Secondary Education (Computer Science)»
Rivne State University of the Humanities

Conclusion. Studying in the educational program «Secondary Education (Computer Science)» is aimed at professional and methodological training of future computer science teachers who can design the educational process for a wide range of pedagogical situations in the context of the discipline, ready to responsibly perform the duties of computer science teacher, methodical activity included.

We describe the professional and methodological teaching of the future teacher: as training –

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6. *Akulenko, I. A.* Features of competence-oriented methodical training of the future teacher of mathematics of the profile school / I. A. Akulenko // Scientific notes. Pedagogical sciences. – 2013. – Vip. 122. – P. 58–66.

a specially organized process of acquiring knowledge, skills and abilities, accumulation of initial experience in the chosen speciality; as a result – the formation of methodological competence that integrates subject, psychological and pedagogical, technological, methodological awareness and professionally significant personal qualities of the individual. We substantiate the validity and expediency of such an approach by covering the procedural and effective components of professional and methodological training of students in HEI.

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