



Chapter IV. THEORETICAL-METHODICAL FUNDAMENTALS OF PROFESSIONAL TRAINING OF FUTURE TEACHERS

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ШЛЯХИ МОДЕРНІЗАЦІЇ ПРАКТИЧНОЇ ПІДГОТОВКИ МАЙБУТНІХ УЧИТЕЛІВ ІНФОРМАТИКИ

Анотація. Необхідною умовою функціонування освіти в умовах цифрового суспільства є її інформатизація, мета якої полягає в радикальному підвищенні ефективності та якості підготовки фахівців на основі широкого використання нових інформаційно-комунікаційних технологій. У статті проаналізовано особливості практичної підготовки майбутніх учителів інформатики за умов функціонування освіти в цифровому суспільстві. Наголошується на тому, що практична підготовка повинна стати наскрізною лінією навчання студента і реалізуватися неперервно в процесі всього навчання у закладі вищої освіти (ЗВО). Запропоновано відносити до практичної підготовки не тільки проведення практик різного виду, а й виконання практичних завдань під час вивчення дисциплін психолого-педагогічного, спеціального та методичного циклів, а також під час виконання курсових, кваліфікаційних та магістерських робіт. Виокремлено шляхи модернізації практичної підготовки майбутніх учителів інформатики на основі впровадження тісної співпраці вищих та середніх навчальних закладів.

Зроблено висновок, що практична підготовка студентів у ЗВО є однією з найважливіших складників процесу методичної підготовки майбутніх учителів, яка стає сполучною ланкою між теоретичним навчанням і майбутньою професійною діяльністю. Інтенсивне зростання запити цифрового суспільства на кваліфікованих фахівців вимагає інтеграції практичної підготовки студентів на всіх етапах навчання у ЗВО, що дасть змогу покращити процес формування загальних та професійних компетентностей, а неперервність практичної підготовки підвищить мотивацію до навчання та готовність до роботи в реальних умовах.

Ключові слова: практична підготовка, учитель інформатики, середня освіта, педагогічні програмні засоби.

WAYS OF PRACTICAL TRAINING MODERNIZATION OF THE FUTURE COMPUTER SCIENCE TEACHERS

Abstract. Training of future teachers in higher education is a complicated and complex process, which includes the study of disciplines of psychological and pedagogical, special and methodological cycle of disciplines, as well as the practice of various types. In the article, the main features of practical training of future computer science teachers under the conditions of education functioning in a digital society, are analyzed. It is emphasized that practical training of students should become a cross-cutting line of student learning and should be realized continuously throughout the whole study process at higher educational institution. It is proposed to attribute practical training not only to the practice of different kinds, but also to the practical tasks during the study of disciplines of psychological and pedagogical, special and methodical cycles, as well as during course, qualification and master's work. The ways of modernization and improving of practical training of future computer science teachers are proposed based on a close cooperation of higher and secondary educational institutions. Importance of developing educational software by students for using it in learning process at a secondary school provided by modern techniques, innovative pedagogical and information technologies is established.

Practical training of students in HEIs is one of the most important components of the process of methodical training of future teachers, which becomes a link between theoretical training and future professional activity. The intensive growth of the digital society's demand for qualified specialists requires the integration of practical training of students at all stages of education in the HEI, which will improve the formation of general and professional competencies, and continuity of practical training will increase motivation to learn and willingness to work in the real world.

Keywords: practical training of students, computer science teacher, secondary education, educational software.

INTRODUCTION



The problem formulation. Training of future teachers in higher education is a complicated and complex process, which includes the study of disciplines of psychological and pedagogical, special and methodological cycle of disciplines, as well as the practice of various types. The specificity of specialized training of teachers is the predominance of the practical component over the theoretical one. In the modern educational process, the priority is to train a new type of employee, which is characterized by professional flexibility and mobility, the ability to adapt to changes due to the development of digital technologies. And such adaptation is impossible without the appropriate practical training of the student, which must be modernized in accordance with the requirements of modern society.

Relevance of the research. A necessary condition for the functioning of education in a digital society is its informatization, the purpose of which is to radically improve the efficiency and quality of training professionals based on the widespread use of new information and communication technologies (Natsionalna stratehiia, 2013). In this regard, the new Ukrainian school challenges the teacher with new professional tasks, the success of which depends not only on the professional development of the teacher, but also on the quality of training of qualified teachers in higher education institution (HEI), able to respond timely and creatively to requests by digital society, often working in uncertainty. In this regard, the urgency of the problem of training future computer science teachers for professional activities is not in doubt.

RESEARCH RESULTS

The National Strategy for Education Development in Ukraine for 2012–2021 states that higher educational institutions must meet the demands of the modern labor market and meet the needs of the national economy, which is provided, in particular, by modernizing the educational activities of universities that train teaching staff based on the integration of traditional pedagogical and the latest information and communication technologies of teaching, as well as the creation of a new generation of textbooks, manuals and teaching aids" (Natsionalna stratehiia, 2013).

The Draft Concept of Education Development until 2025 states that one of the responses of the educational system to the growing challenges of life is the creation of material, technical and organizational conditions for the formation of educational and scientific clusters (based on free economic science), in which basic science should be supported by applied research» (Proekt Kontseptsii, 2014).

In (Balaban, Balaban, & Ivanov, 2015) it is emphasized that the competitiveness of the graduates is largely determined by the practical training of students, which is one of the important forms of organization of the educational process. The process of studying in HEI should be aimed at training a specialist who not only has a thorough knowledge of general and professional disciplines, but also the ability to mobilize their knowledge and skills to solve specific professional problems, arguing ways to solve problems and skills to work professionally in a team on the principles of the commonwealth (Shevchuk, & Sidelnyk, 2017). Professional competence is an integrated indicator of the quality of a future specialist training.

Problems of training of future teachers of computer science for professional activity, their practical training, formation of professional competences and development of information culture were studied by many scientists (eg, V. Bykov, Yu. Horoshko, A. Hurzhiy, O. Honcharova, M. Zhaldak, V. Lapinskyi, M. Lapchyk, N. Morse, S. Ovcharov, N. Ponomareva, S. Postova, Y. Ramskyi, V. Rudenko, O. Spivakovskiy, Spirin, Y. Tryus, H. Tsybko, M. Shkil, etc.) Despite the fact that the problem of pedagogical practice in the system of professional training of future teachers is considered in great detail, its importance in recent years has been significantly reconsidered (Ovcharov, 2011; Ponomaryova, 2017).

The purpose of the study is to analyze the features of practical training of students majoring in "Secondary Education (Computer Science)" and search for opportunities to improve the ways of practical training of future teachers of computer science in accordance with the requirements of the digital society.

Presenting main material. The training of future computer science teachers is based on thorough theoretical and practical components. Theoretical training is carried out in the process of studying the disciplines of psychological and pedagogical, special, methodological cycles, and practical - both in the process of mastering academic disciplines and during all types of practices. The integration of theoretical knowledge and practical training is a necessary component of gaining experience in solving professional problems in order to form professional competence. Digital society requires highly qualified teachers and creative scientific and pedagogical thinking. The current level of development of information and computer technologies (ICT) significantly expands the capabilities of teachers, simplifying access to educational and professional information, improves the functionality and efficiency of learning resources management, and promotes the integration of national information and education systems into the global network.

The practical training of future teachers of computer science is largely implemented in the framework of internships of various kinds during education in the specialty "Secondary Education (Computer Science)" at the educational levels "Bachelor" and "Master". Let's briefly analyze the essence of such training.

In the process of passive pedagogical practice in junior years, students get acquainted with the peculiarities of the educational process, techniques and methods of teaching and educating students, studying the experience of teachers and class teachers, which is a very important aspect of future teachers' skills. It is during the acquaintance with the educational process in secondary schools that the process of adaptation of students to the future professional activity of a computer science teacher begins.

The experience gained during pedagogical practices during junior years and in-depth theoretical knowledge students use in the process of active pedagogical practice in the final year of bachelor's and master's degree, when performing



the functions of computer science teacher and class teacher in primary and secondary school. In the process of these practices, students deepen and consolidate theoretical knowledge and learn to apply them in practice; master modern methods, forms of educational work; carry out training and education of students both in lessons and in the system of extracurricular activities; form pedagogical professional qualities and interest in research work in the field of pedagogical sciences; learn to act as a computer science teacher and class teacher.

L. Katsova emphasizes the main shortcomings in the structure of the educational process in higher pedagogical educational institutions, namely: the lack of a clear professional and pedagogical orientation in the system of teaching special and psychological-pedagogical disciplines and their connection with practical work at school; insufficient logical sequence and interconnection in the study of disciplines, which should ensure the integration and specialization of professional training of future teachers in practice; insufficient involvement of students in active forms of educational work; the lack of a scientifically sound system of gradual formation of students' general pedagogical knowledge, skills and abilities to work with students during all years of study in higher education as the basis of pedagogical skills of the future teacher (Katsova, 2005).

In our opinion, it is necessary to structure the educational process in all courses so that lectures and practical classes in the disciplines are in a logical relationship with the tasks of pedagogical practices.

The problem of professional training of computer science teachers is inextricably linked with the use of digital technologies in education. A computer science teacher must receive appropriate training in this field from the HEI. Today, there are a large number of electronic educational resources (educational, methodological, reference, etc.) available on the global Internet, which teachers can effectively use in their professional activities. At the same time, current trends in education (continuing education, open education, distance education, etc.) require teachers to master the methods and means of creating their own educational resources. In this regard, it is necessary to introduce into the pedagogical process training courses designed to form the theoretical knowledge and practical skills of students to develop pedagogical software for educational purposes and methods of using them in modern school (Dudka, Vlasii, & Bolshakov, 2016). A necessary component of the process of developing such tools is their testing, during which students can identify in practice all the strengths and weaknesses of their development, especially the methodological plan. Therefore, future computer science teachers need to have deep knowledge in the field of using the educational potential of digital technologies to be able to use them in the future in their professional activities.

In the context of the study of the problem, we consider it appropriate to focus on the need to improve and modernize the practical training of future teachers of computer science. In particular, we offer the following possible ways of such modernization:

- practical purpose of teaching all disciplines of professional training;
- direct cooperation of higher and secondary educational institutions, which may consist, in particular, of submitting requests for the development of the necessary methodological materials required in the modern school by teachers and the development of such materials in the final work in the study of courses, coursework, qualifications, etc. Such cooperation will allow teachers to feel support in the implementation of creative ideas and their implementation in the educational process, and students □ to feel responsible for the work done and be active participants in the real educational process;
- acquaintance with industrial enterprises, consumer service enterprises, IT clusters, etc. within the production (pedagogical) practice in order to guide future computer science teachers in the requests of modern companies for an IT specialist to prepare students for choosing a profession;
- maintaining a permanent site of practical training of the student, which should cover all their practically valuable achievements.

As part of research practice, master's students majoring in "Secondary Education (Computer Science)" at Vasyl Stefanyk Precarpathian National University under the guidance of associate professors of Mathematics and Computer Science and Teaching Methods Olesia Vlasii and Olha Dudka conducted open events for students to test self-developed teachers software. Junior students were involved in conducting such classes in order to acquaint them with different types of practical training. Master's students participated as volunteers in the event "Interesting vacation", implemented in the framework of the educational project "University of the Gifted Child" at the Science Park "Precarpathian University" during 2017–2020 academic years. For example, in 2018, such events as "Computer Wisdom" and "Quest from the Language Purgatory" were held, in which graduate students Yuliia Berezhna, Nataliia Mahomet, Oksana Demianchuk excelled. "Computer Wisdom" is an online quest for the development of logical thinking and information and communication skills, which involves a series of logical tasks of various types and levels of complexity. "My first computer game" is a course of practical lessons in programming in the Scratch environment with the use of game technologies, the purpose of which is to increase the interest in programming of modern schoolchildren. "Quest from the Language Cleaner" is an online quest to develop language competence, increase interest in language literacy and the digital skills formation.

Also, students involved in this specialty are engaged in the annual Tournament of young scratchers not only as the organizers' assistants, but as consultants to participants and co-developers of creative tasks in the final tasks in the disciplines "Programming", "Methods of computer science teaching" and "Modern technologies in computer science



teaching". This practical orientation of their tasks significantly increases the motivation to learn, responsibility for the work done and improves the process of acquiring professional skills.

The effectiveness of the classes is confirmed by the positive feedback of both students who participated in them and their teachers and parents. Requests for such open events indicate the need for active cooperation of teachers, students, teachers of secondary schools and parents of schoolchildren. We would like to emphasize the unity of generations during the events. It was very interesting to watch how the youngest participants of the event were helped by their grandmothers while solving language tasks and their mothers chased an electronic ball on the football field with the children who created this game themselves. Such a community deserves attention as one of the ways to implement cooperation between the school and the family.

CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCH

Practical training of students in HEIs is one of the most important components of the process of methodical training of future teachers, which becomes a link between theoretical training and future professional activity. The defining component of practical training of students is, of course, different types of practices, during which future teachers deepen their knowledge, gain the first pedagogical experience, and improve methodological skills and abilities. However, the intensive growth of the digital society's demand for qualified specialists requires the integration of practical training of students at all stages of education in the HEI, which will improve the formation of general and professional competencies, and continuity of practical training will increase motivation to learn and willingness to work in the real world.

Prospects for further research. In the future it is planned to continue to intensify the practical training of future teachers of computer science by introducing group forms of work for the development of pedagogical software for educational purposes.

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