



## FORMATION OF PROFESSIONAL COMPETENCES OF FUTURE PROGRAMMERS THROUGH INFORMATION AND COMMUNICATION TECHNOLOGIES

Norinov Muxammad Yunus Usibjonovich

Researcher of TITU of Fergana branch, Head of External Department  
<https://doi.org/10.5281/zenodo.8357813>

**Abstract:** the article considers the specifics and problems of developing professional competencies of future programmers with the help of information and communication technologies (ICT). It is noted that the use of these funds is necessary to improve the quality of higher education, to ensure the competitive advantages of the university and its graduates. It was stated that modern technical means are the important prerequisite in the organization of active formation of professional knowledge and skills of future programmers, and determine the high competence of graduates. The conclusion is made that the use of information and communication technologies has a positive pedagogical influence on the formation of the creative abilities of the programmer. It was also noted that further use and development of ICT is a necessary condition for the dynamic development of the national education system in the digital age.

**Keywords:** ICT, programmers, professional competences, professional knowledge, didactic principles, higher education.

Formulation of the problem. The introduction of information and communication technologies (ICT) creates prospects in all aspects of the daily life of mankind, without which today it is difficult to imagine the future of the country. In particular, full-fledged training of specialists in higher educational institutions today is impossible without the use of ICT tools. Moreover, the formation of professional competence of future programmers cannot be ensured without the use of ICT tools based on computer equipment and technologies that are specialized for a programmer. In this regard, it is necessary to encourage teachers to use ICT more widely to achieve high professional knowledge among future IT workers.

Knowledge of modern technologies and mastery of them is one of the conditions for effective activity and successful training of future specialists. This is a promising step towards success in developing professional knowledge in the field of programming. Analysis of research and publications. The issues of using information and communication technologies in modern education are well covered in currently available scientific sources. In this regard, for example, we can mention the works of T.M. Derkach [1], N.N. Kadrakaeva [2], S.D. Karakozova [3], S.V. Panyukova [4], G.A. Fedorova [5], Z.V. Shumyakina [6] and others.

Identification of previously unresolved parts of a general problem. At the same time, the problems of teaching information and communication technologies for students - future programmers - have not been sufficiently developed. In this regard, we can mention the publication of S.V.

Kruchinin [7], as well as articles by A.A. Rybanova [8], G.S. Ivanova [9] and L.M. Medzhitova [10], devoted to the use of certain ICT tools in training programmers. Thus, the formation of professional competencies of future programmers with the help of ICT today

remains a little-researched area, which determines the relevance of further scientific research in this direction.

The purpose of the article is to highlight the prospects for developing professional competencies of future programmers using information and communication technologies. Presentation of the main material. In the last decade, modern pedagogical ICT software has come into teaching practice, providing students with access to such sources of information as electronic textbooks, websites, cloud software systems, etc. All this makes it possible to improve the development of cognitive activity and provides new opportunities for creative growth students, helps enrich the educational process with an emotional-visual form of cognition.

The educational process with the help of ICT tools is a current pedagogical approach, which has many advantages compared to traditional technologies, namely: it effectively stands out in the organization of independent work, which accounts for the majority of the workload (self-training of students), and also provides an impetus in the process of technology modernization presentation of information. In general, education is based on important didactic principles on which the use of modern ICT in the educational process is based [11, p. 278]. Based on the principles of learning, special principles can be identified. Like any traditional means, they should be subject to the well-known principles of teaching: scientific, visual, systematization (sequence of actions), the principle of individual approach and accessibility. Let's give a brief description of each of them.

The scientific principle characterizes not only the methods and criteria for preparing the content of educational material, but, first of all, the use of ICT tools, which must be identical to scientific knowledge and at the same time accessible to students' understanding.

The principle of visibility makes it possible for ICT tools not only to show students a model of the object of study, but also to shape students' activities based on the results of its transformation, because Learning efficiency increases when students build models on their own, and not just see them in finished form. This is precisely what information technology contributes to. Such software tools include electronic lectures, presentations, simulators, modeling systems, simulators, video lessons, tests that can be created for any discipline. The principle of systematization of ICT tools allows you to develop your own scheme for using modern tools and a sequence of actions during a training session to achieve pedagogical goals.

The principle of an individual approach to the use of ICT tools is understood as creative initiative of the teacher when organizing a training session. Not all students learn the material in the same way, so electronic means make it possible, using a computer, to repeat the material many times at a pace convenient for each student and control the degree of its assimilation.

The next principle of ICT accessibility is related to the principles of systematicity and consistency, since only that knowledge that is transmitted in strict sequence and in compliance with the rules of a certain order becomes understandable for perception and assimilation. But in our case, this principle is not so important, since the use of new ICT tools takes into account the possibility of inconsistent selection of educational material by students when working with, for example, an electronic textbook, which makes it possible not to adhere to a strictly defined algorithm of work.

Such a principle should have the goal of a high result, and for this it is important to skillfully build a scheme for presenting professional knowledge, which can change in the

process and make it possible not only to work along a strictly defined trajectory, but also to return or choose a module to start acquiring new knowledge. This refers to the student's right to choose to study modules, which is widespread in the practice of foreign universities, as mentioned in detail in our article "Foreign experience in professional training of programmers", while the general context of the selected modules should not be interrupted and have a logical conclusion.

In general, information and communication technology tools should be developed on the basis of curricula and course programs, fit well into the learning process and be offered as tools for group and independent work in the learning process.

In the educational process, ICT can be used as: a teaching tool (lectures), which improves the learning process; means of self-education;

instrumental and methodological support of the training course, management of the learning process;

when conducting laboratory work and monitoring knowledge. One of the significant aspects of information and communication technologies that must be taken into account is that they are quite productive when used not only in classroom teaching, but also when organizing independent work, where the student must independently master a significant amount of educational material. Independent work is one of the types of educational activities with which you can improve the quality of training of specialists in any field of education, especially programmers.

An individual approach can use various ICT tools and be used in various works in the form of: solving individual tasks in the classroom; working with the modular part of electronic manuals (learning new material, performing laboratory work, monitoring knowledge); independent mastery of educational topics of a course (independent work) or module using an electronic textbook, electronic lectures; independent monitoring of students' knowledge to analyze the assimilation of the material; acquisition by students of the best skills and abilities with the help of simulators and simulation programs; performing other work planned by university training programs.

On the one hand, ICTs are a teacher's tool in a lecture class, and on the other hand – make it possible, in the event of a replacement or absence, to exclude missing a lesson using information and communication technologies, prepared in advance and contained in the educational and methodological complex of the course (for example, electronic lectures, multimedia presentations).

In the practice of the educational process, the combination of combined teaching aids, namely the use of ICT tools with a lecture session [9;12]. An example of such a combination is a video tutorial. This teaching method leads to more effective perception, increased motivation for learning and memorization of information, since this method combines the main factors of human perception of the educational product - vision and hearing, which actively influence students - future programmers, and attract them to the educational process. It is advisable to use this tool not only in classroom work, but also for self-training of absentees or students under special conditions (free attendance), because it has a positive effect on the formation of future specialists: with its help you can easily complete a certain module independently, without the participation of a teacher and gain knowledge by watching video lessons created by a teacher on the topic, acquire problem-solving skills, etc. This technique has shown good results in mastering new educational

material [8], as a result of which future specialists effectively solve the practical tasks assigned to them in laboratory work and more confidently give answers to test questions.

The use of ICT in the training of programmers has a number of other didactic advantages that make their use attractive for use in practical education. These include, for example, flexibility, speed, and the integration of information and communication components. It is believed that a person has five channels of assimilation of information (touch, smell, hearing, taste) [13, p. 87], but there is one thing: for each person (student) these channels are developed differently. Determining which product will be most effective is not always easy.

It is known that there are the following inclinations of students' individuality [14, p. 788-789]:

kinesthetics (eng. kinesthetic – “kinesthetic”, “sensitive to movements”) –

such students, first of all, have a sensitive experience, they remember tactile contacts, smells, physical events, etc. well;

visual learners are students who perceive most of the information with the help of the organ of vision, for example, there is a text in a textbook, in order to memorize it, such students need to read it personally;

auditory learners are students who remember basic information using the auditory canal. They may not look at the interlocutor, but the information is still absorbed.

Of course, the teacher is physically unable to take into account the dominant channels of perception of each student. The way out of this situation lies precisely in the combined use of ICT to achieve the effectiveness of the formation of professional knowledge of students [15, p. 94].

Modern information, technical, printing, audiovisual and multimedia tools are becoming integral high-quality components of the educational process; they introduce specificity in the form of inseparable methods and means, which is a kind of pedagogical technology based specifically on the use of modern ICT tools [16, p. 113].

It is the use of ICT tools by university teachers that is necessary to improve the quality of higher education. Their use makes it possible to increase the effectiveness of the educational process and stimulate students' interest in better assimilation of new knowledge, and has a positive pedagogical impact on the formation of the student's creative abilities. The personality of the future specialist is being developed and prepared for a comfortable life in the information society. At the same time, it is important to develop in students a professional desire for constant self-education and advanced training in the field of information competence. A future programmer who effectively masters information and communication technologies, knows how to work with information, has a progressive thinking style, and has a fundamentally different approach to assessing problems and organizing his activities in general. The relevance of the issue of the influence of ICT stimulates future specialists to high quality independent search and analysis of information; promotes creative and effective solution of problems facing them in the process of work; allows you to navigate in any environment; professionally use modern means of information and communication technologies in their practical activities, ultimately ensuring improved quality and productivity.

If used skillfully, information and communication technologies can become a powerful tool that will increase learning productivity, improve employment opportunities, and generally improve the living conditions of a programmer in the future.

Training students using ICT means obtaining a full-fledged education at a new level, advanced training, development of self-training abilities and covers the entire education system as a whole. We are talking about positive changes at all stages of education, and not in the distant future, but in the near future.

The further use and development of information and communication technologies is a necessary condition for the dynamic development of education.

Prospects for further research in this direction may include the specifics of specialized training and retraining of programmers in accordance with current needs in the Russian and foreign labor markets.

### References:

1. Деркач Т.М. Эффективные методы использования информационно-коммуникационных технологий в образовании : монография / Т.М. Деркач и др. ; под общ. ред. В.П. Малого. Красноярск: Центр информации, 2013. 223 с.
2. Кадракаев Н.Н. Средства ИКТ, применяемые в образовании / Н.Н. Кадракаев // Наука для развития информационного общества: сборник материалов VII Всерос. науч.-техн. конференции. Ставрополь: Изд-во СКФУ, 2018. С. 116-119.
3. Каракозов С.Д. Условия результативности системной трансформации учебного процесса на основе ИКТ в образовательном учреждении / С.Д. Каракозов Н.И. Рыжова, А.Ю. Уваров // Инновационные технологии в медиаобразовании: материалы II Междун. науч. практ. конференции. СПб: Издво: Санкт-Петербургского гос. ин-та кино и телевидения, 2018. С. 227-235.
4. Панюкова С.В. Использование информационно-коммуникационных технологий в образовательной и научной деятельности технического вуза: монография / С.В. Панюкова и др.; под ред. В.С. Гурова. Рязань: Ред.-изд. центр РГРТУ, 2013. 326 с.
5. Федорова Г.А. Актуальные вопросы использования информационно-коммуникационных технологий в образовательном процессе : монография / Г.А. Федорова и др.; под общ. ред. Н.В. Лалетина Красноярск: Перспектива, 2014. 231 с.
6. Шумякина З.В. Преимущества введения ИКТ в образовательный процесс / З.В. Шумякина // Российская наука в современном мире : сборник статей XIV междун. науч.-практ. Конференции, 2018. С. 84-86.
7. Кручинин С.В. Проблематика преподавания ИКТ для программистов / С.В. Кручинин // Информатика: проблемы, методология, технологии. Информатика в образовании материалы XVIII Международной школы-конференции. Воронеж: Изд-во ООО «Веллборн», 2018. С. 28-30.
8. Рыбанов А.А. Видеоурок как средство эффективного обучения прикладному и системному программному обеспечению / А.А. Рыбанов // Дистанционное и виртуальное обучение, 2009. № 11. С. 42-48.

9. Иванова Г.С. Особенности использования мультимедийных технологий при чтении лекций по программированию / Г.С. Иванова // Наука и образование: научное издание МГТУ им. Н.Э. Баумана, 2014. № 3. С. 373-387.
10. Меджитова Л.М. Мультимедийные интерактивные средства в преподавании программирования // Л.М. Меджитова, Р.Т. Фазылова, Э.И. Абляимова // Информационные технологии в образовании, 2011. № 10. С. 110-116.
11. Мирзоев А.Р. К вопросу об эффективности дидактического обеспечения учебного процесса на основе ИКТ / А. Р. Мирзоев // Вестник Российско-Таджикского Славянского университета, 2014. Т. 1. № 2 (45). С. 276-282.

