

# Formation of professional competence of future specialists in the field of information environment

## Formación de la competencia profesional de futuros especialistas en el campo del entorno de la información

DEMkina, Nadezhda I. 1; KOSTIKOV, Pavel A. 2 & LEBEDEV, Kostyantyn A. 3

Received: 20/02/2019 • Approved: 25/06/2019 • Published 08/07/2019

### Contents

1. Introduction
2. Methods
3. Results
4. Discussion
5. Conclusions

Bibliographic references

#### ABSTRACT:

The paper is aimed at the development of approaches to the formation of the professional competence of future specialists in the field of the information environment. The obtained results indicate that the level of motivation and personal qualities of most future specialists in the field of information, in both experimental and control groups, is at a low level. It is proposed to develop a structural and functional model of the professional competence formation of future programmers and individual components of the educational and scientific information environment, elements of methodological complexes that will be focused on meeting the educational needs of modern students. It has been proved that the creation of such a model that meets the requirements of the information society, should be carried out on the principles of fundamentality, professional orientation, scientificity, accessibility, integration of promising psychological and pedagogical concepts and approaches, widespread use of information and communication technologies. Based on the results of the study, the organizational conditions for improving the efficiency of the professional competence formation of future specialists in the information sphere have been determined.

**Keywords:** information, Internet, efficiency,

#### RESUMEN:

El documento está dirigido al desarrollo de enfoques para la formación de la competencia profesional de futuros especialistas en el campo del entorno de la información. Los resultados obtenidos indican que el nivel de motivación y las cualidades personales de la mayoría de los futuros especialistas en el campo de la información, tanto en grupos experimentales como de control, se encuentran en un nivel bajo. Se propone desarrollar un modelo estructural y funcional de formación de competencias profesionales de futuros programadores y componentes individuales del entorno de información educativa y científica, elementos de complejos metodológicos que se centrarán en satisfacer las necesidades educativas de los estudiantes modernos. Se ha demostrado que la creación de un modelo de este tipo que cumpla con los requisitos de la sociedad de la información debe realizarse sobre los principios de fundamentality, orientación profesional, científicidad, accesibilidad, integración de conceptos y enfoques psicológicos y pedagógicos prometedores, uso generalizado de Tecnologías de la información y la comunicación. Sobre la base de los resultados del estudio, se han determinado las condiciones organizativas para mejorar la eficiencia de la formación de competencias profesionales de los futuros especialistas en el ámbito

# 1. Introduction

Among the trends of society that significantly affect education, one can highlight the active development of mobile technologies, the creation of open electronic content, the emergence of virtual educational gaming technologies, and the use of social networks for learning. In this regard, there is a need for a qualitatively new training of specialists, which allows combining the fundamental nature of professional basic knowledge with innovative thinking and practice-oriented research approach to solving specific educational problems.

In the process of training of a future specialist in the field of the information environment, his/her formation as a person, a professional ready for changes, especially in the educational system, is of importance. Therefore, the professional competence formation of future specialists in the field of information environment can be determined by the following factors: a new educational paradigm that predetermines the transition from the continuous open education and is based on the integration of information and communication technologies, the introduction of personality-oriented and competence-based approaches to learning, innovative educational practices, which requires the formation of appropriate competencies of future specialists in the field of information environment.

The research of professional competence formation problems related to specialists in the field of information environment has been reflected in the works by N.R. Alekseeva (2016), E.V. Bogdanova (2016), I.I. Eremina(2013), T.A. Matafonova(2014), S.L. Myakisheva (2017), M.D. Stadnikova (2015), etc. However, the above studies do not solve all the problems related to the improvement of professional training for specialists in the information sphere according to the current state of technology development and labor market conditions. The training, which provides for the compliance with management positions in IT companies, is of importance.

---

# 2. Methods

The methodological basis of the research is the fundamental provision of the modern educational process. The solution of the tasks was carried out from the standpoint of the systematic approach using the following modern research methods: historical and monographic methods, the method of abstraction – to study and summarize the theoretical and methodological foundations of the formation and development of information education; economic-statistical and economic-mathematical methods, tabular, graphic and cartographic methods – to establish the main trends in the development of training of future programmers.

The information base of the research is the laws and regulatory data of state bodies, operational analysis data, works of Russian and foreign scientists, Internet resources, documents regulating the development and support of training of specialists in the information environment.

In the process of the research, it is planned to develop the main directions of increasing the professional competence of information environment specialists, to develop measures to coordinate the activities of specialists in the framework of the functioning of the information educational environment, to justify the position of management of information education development in modern conditions.

---

# 3. Results

The new educational paradigm predetermines the transition from continuous open education and is based on the integration of information and communication technologies, the introduction of personality-oriented, competence-based and resource-based approaches to learning, innovative educational practices. It requires the study of the level of professional competence of future programmers. During the study, we put forward the following working

hypothesis. The formation of professional competence of future programmers will be effective in case of selection and training of teachers according to the modern requirements of training and creation of information and communication environment, appropriate for training tasks aimed at the formation of professional competence. We have chosen as the criteria of professional competence development of future programmers its structural components. Criteria, indicators of professional competence formation of future programmers and methods of their identification are presented in Table 1.

**Table 1**  
Criteria and indicators of professional competence formation  
of future programmers in the information field

<b>Criteria</b>	<b>Indicators of professional competence formation</b>	<b>Methods for indicators' identification</b>
Value and motivational	Formation of orientation to the profession of a specialist in the field of information, the development of new technologies, modification of one's own professional development, obtaining results.	Methods of professional activity motivation study. Our questionnaire on the definition of professional orientation.
Reflexive	Formation of the ability to realize and analyze one's own mistakes, self-assessment of the professional level, conscious perception of oneself as the subject of the educational process.	A questionnaire aimed at determination of the formation level of self-control, self-esteem and reflexivity of the programmer.
Personal	Ability to analyze new situations, get along with others, take initiative, make decisions and be responsible, sociability, goodwill, attention to detail, strong will and leadership qualities.	Observation. Our questionnaire on self-determination of personal qualities necessary for a successful career in the IT industry.
Informative	A set of professional knowledge about new technologies, such as the Internet of things and cloud technologies.	Our tests aimed at controlling these elements of knowledge.
Operational and technological	Ability to develop one's own part of the project using certain technologies. The ability to combine one's own experience with the developments of other project's participants.	Our packages of individual projects and tasks to control the quality of skills.

According to the developed approach, the indicators of professional competence formation were distributed by levels: high, medium, low.

To determine the level of formation of the value and motivational component of professional competence, we have developed the relevant indicators represented in Table 2.

**Table 2**  
Indicators of formation of value-motivational professional competence  
component of future specialists in the information field

<b>Level</b>	<b>Indicators</b>
	Has a strong desire to master the program of training in the programmer specialty; participates in public events held by IT companies; realizes the value of the chosen profession and the features of building a career in the industry; has a desire to apply the knowledge and experience in future professional activities, perform

High	complex, creative tasks, enjoys solving professional problems, achieving results; possesses willingness to explore applied subject areas, objects of professional activity; realizes the need for continuous self-improvement as an integral part of work in the IT industry; has willingness to work in a team and train others.
Medium	Has an interest and is aware of the need to study a part of vocational training subjects, to participate in projects, has a craving to overcome difficulties; is interested in new products in the IT industry; tries to independently understand the part of the material that finds interesting or mastery of which is a necessary need.
Low	Shows interest in studying several subjects of professional training as a necessary condition for further employment.

It should be noted that, from our point of view, not just the motivation to learn a certain training course and obtain professionally significant knowledge is important.

Therefore, in the developed evaluation system, among the indicators, we have chosen those that allow determining the value attitude to the profession, awareness of the need for constant self-monitoring of trends in the IT industry and the development of new programming technologies, as well as the presence of certain personal qualities necessary for successful cooperation with other programmers and interaction with customers. To assess the level of manifestation of the reflexive component of the professional competence of a future specialist of the information sphere, we have developed indicators, which are shown in Table 3.

**Table 3**  
Indicators of formation of reflexive professional competence  
component of future specialists in the information field

Level	Indicators
High	Has the ability to self-assess the professional level and the definition of the program of personal professional development; is able to analyze and critically evaluate one's own results, including contribution to the work of the team; possesses awareness of responsibility for the result of activity; is able to adjust actions and has an internal plan of professional development; is able to simulate the situation and choose the best way to achieve goals.
Medium	Is able to determine the purpose of activities, plan activities to achieve results, evaluate the result, analyze, highlight the key elements.
Low	Is able to determine the purpose of the activity and evaluate the result, possesses the ability to understand and analyze one's own mistakes.

The practice has shown that the role of a teacher is changing, as they are able to apply active and interactive methods, individual approach, flexible means for monitoring, conducting surveys, consultations. In this aspect, one can use the flipped class technology, which provides for the redistribution of time between the classroom and extracurricular training. This method has the flexibility and gives the opportunity to actively involve students in the learning process, makes it possible to create a dynamic and creative environment in which future specialists of the information sphere learn to think critically and work together on the tasks.

The flipped class model is a part of a broader direction and intersects with blended learning,

project-based learning and other learning methods and tools that are flexible and provide greater activity and involvement of future information professionals in the learning process. The flipped class model uses the time of classroom training for every course in different ways: from the primary solution of practical problems by reducing the lecture block to the discussion of projects.

It is also possible to use blended learning technologies. In this case, the emphasis is on independent planning of the students' load. During the use of blended learning technologies, the learner can influence the speed, consistency and ways of learning. However, an individual approach is difficult to implement in the traditional learning system, and its implementation has become possible due to the combination of online learning technologies and the work of the teacher with the needs of every student. A student can independently acquire knowledge using links to electronic content prepared by the author, online courses of varying complexity, developed by specialists of other educational institutions, determine the time and duration of training.

One of the directions of further development of programmers' training is the opening of educational programs in the online format for the specialty "Internet of things". The study of educational material through online courses, video lectures and workshops with specialists of IT companies will alternate with work on projects under the guidance of teachers. At the same time, students will be able to enroll in separate courses and not to take the whole program.

In addition, it is possible to improve the organization of space for practical training in order to reduce the expenditure of the educational organization on equipment, ensuring the availability of equipment to a wide range of students, the conversion of classrooms to the necessary requirements. In an educational organization, it is possible to create an Internet of things laboratory.

An Internet of things laboratory can be a working space or a workshop where practical classes, laboratory work will be carried out within the framework of training sessions on the course "Internet of things", as well as projects that will discover new phenomena in the field of electronic equipment, tools and programming methods.

The study of the level of manifestation of future specialists' personal qualities in the field of information environment was determined by observation and the developed questionnaire. Based on the analyzed scientific sources on the problems of training future programmers and their successful professional activities, among important personal qualities the following can be identified: ability to quickly delve into the application industry (critical and analytical thinking); ability to work in a team (communication skills, goodwill, tolerance, commitment, ability to plan and distribute the work); leadership skills (especially important at the level of training).

To conduct the research, we formed experimental and control groups of future specialists in the field of information. As a result of the ascertaining stage of the study, in the selected control and experimental groups, the averaged indicators of almost the same level of formation of knowledge, practical skills, motivation and reflection in both groups have been revealed.

The students demonstrated mostly low and medium levels of formation of professional competence. Thus, in the experimental group, the low level of the studied phenomenon was revealed in 77.36% of students, in the control group –in 77.92%. The medium level of professional competence of future programmers was revealed in 27.3% in the experimental group and 27.43% in the control groups.

Even though the respondents understood the importance of information processes taking place in the society, the results of the initial state demonstrated the lack of knowledge necessary for future successful professional activity, practical skills of formation of motivation and reflection on the formation of professional competence of future programmers.

An important factor influencing the formation of professional competence of future specialists in the information field is motivation, so with each group of the respondents we

conducted the survey twice in order to identify conscious attitude to learning, awareness of career prospects and features of work in the IT industry and the structure of motives for further activities.

It should be noted that at the end of training, most students (98%) who took part in the survey, see their future in work as a programmer. In recent years, there has been a tendency in the reduction of the number of graduates of specialties related to work in the field of IT, who wish to engage in scientific research (1.5 %) and work as a teacher (0.5 %). This, in our opinion, is primarily due to the active development of this industry, the demand for graduates in the labor market and significantly higher wages in the business sector than in the education system. At the same time, future programmers realize the importance of mastering the material for scientific research and organization of effective interaction with other people, in particular for educational purposes, and perceive these aspects as integral components of future professional activity.

---

## **4. Discussion**

The reliability of the presented approaches to the professional competence formation is confirmed by the fact that future specialists in the field of information environment have high ambitions and high self-esteem, which according to employers, does not correspond with the level of their practical training. This indicates a lack of reflection and awareness of the features of a programmer's career in modern conditions. Also, a high level of desire to work as a programmer is not always sufficient motive for hard work in situations related to solving complex professional problems.

The survey conducted to determine the personal qualities important for the successful work of the programmer, also allowed to identify problems in understanding the prospects of future career and the current state of development of the IT industry. It has been found that the requirements for a future specialist in the information environment field meet the requirements of IT companies to project leaders, managers, etc. That is, a specialist, having received some practical experience in the IT company, is a potential team leader who is able to organize the work (plan time, distribute roles), create a working atmosphere, make decisions and be responsible for them, be focused on achieving results.

---

## **5. Conclusions**

The results of the ascertaining experiment indicate that the level of formed motivation, reflection and personal qualities of most future specialists in the information field, in both experimental and control groups, is at a low level. This demonstrates the need to improve the methodological system of professional competence formation of future programmers and the creation of a mechanism for the purposeful formation of motivational mechanisms and the development of reflection.

It is proposed to develop a structural and functional model of the professional competence formation of future programmers and individual components of the educational and scientific information environment, elements of methodological complexes that will be focused on meeting the educational needs of modern students and the modern requirements of the labor market in the field of IT. The creation of such a model that meets the requirements of the information society should be carried out based on the principles of fundamentality, professional orientation, scientificity, accessibility, integration of promising psychological and pedagogical concepts and approaches, the widespread use of information and communication technologies.

Based the results of the study, the organizational conditions for improving the efficiency of the professional competence formation of future specialists in the information field that meet the requirements of the modern educational paradigm in the framework of the three-subject didactic model and based on the principles of personality-oriented, competence-based and resource-based learning have been determined. It is, first of all, the availability of teachers who meet the modern requirements of training programmers, the provision of IT technologies adequate to the tasks of training, the inclusion of a future specialist of the

## Bibliographic references

Alekseeva, N.R., Danilova, O.V. (2016). Formation of ICT competence of future specialists in the field of advertising in the information and communication subject environment. Bulletin of Chuvash State Pedagogical University named after I.Ya. Yakovlev , 2(90), 60-66.

Bogdanova, E.V. (2018). Model of the process of formation of inclusive competence of students in the information and educational environment of the University. Vocational education in Russia and abroad , 1(29), 107-113.

Eremina, I. I., Sadykova, A.G. (2013). Methodology for assessing the level of formation of information and communication competence of future it professionals. Fundamental research, 10(10), 2258-2264.

Matafonova, T.A., Chopanov, A.Kh. (2014). Model of formation of professional competence of future specialists of tourist profile in the information educational environment. World of science, culture, education, 1(44), 113-115.

Myakishev, S.L. (2017). The role of information and educational environment of the University in the process of formation of professional competence. Scientific and methodical electronic journal Concept, 27, 250-252.

Stadnikov, M.D. (2015). Model of formation of professional and communicative competence of specialists in technical protection of information with the use of integrated information environment. World of education - education in the world, 4(60), 259-272.

---

1. Financial University under the Government of the Russian Federation, College of Computer Science and Programming, Moscow, 125993, Russia. E-mail: [nadezhda\\_demkina@list.ru](mailto:nadezhda_demkina@list.ru)

2. Financial University under the Government of the Russian Federation, College of Computer Science and Programming, Moscow, 125993, Russia

3. Institute for Tourism and Hospitality, Moscow, 125438, Russia

---

Revista ESPACIOS. ISSN 0798 1015  
Vol. 40 (Nº 23) Year 2019

[\[Index\]](#)

[In case you find any errors on this site, please send e-mail to [webmaster](#)]