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Model of professional self-determination of schoolchildren in the IT-sphere

The article presents a model of professional self-determination of schoolchildren in the IT sphere, which is a system of organizing the preparation of students for professional choice, taking into account their abilities, aptitudes and interests, as well as the economic situation in the country. The research methodology consisted of methods of analysis and generalization of legal documents in the field of general secondary education, as well as research works of domestic and foreign scientists in the field of student profiling and professional self-determination of students. The results obtained in the process of testing this model make it possible to predict the possibility of its successful implementation in schools. All this will contribute to the purposeful preparation of young people for the conscious choice of their future profession, which can be considered the key to success in their subsequent work activities.

Keywords: profiling, IT-sphere, model of professional self-determination of schoolchildren, extracurricular activities.

The particular complexity of the problem of professional self-determination of schoolchildren in modern conditions is determined, on the one hand, by a combination of economic, social and psychological problems, on the other hand, by the insufficient preparation of an individual to exercise professional and personal choice not only in the process of schooling, but throughout life.

Professional self-determination of an individual is interpreted from different perspectives: how to design one's life, which is based on the correlation of personally significant goals and methods of their realization (K.A. Abulkhanova - Slavskaya, N.F. Geyzhan); as «Self-concept of an individual, reflecting understanding, experiences and intentions, substantive actions of professional activity in specific social conditions» (S.N. Chistyakova, A.L. Zhurkin), etc. [1]. Recently, there has been a tendency to unite various approaches to the definition of the essence of professional self-determination, in which the situation of choice is associated with the process of independent and conscious finding by a person of the meanings of work performed, all life activities in specific conditions (E.A. Klimov, K.M. Levitan, K.K. Platonov, N.S. Pryazhnikov, V.D. Semenov) [2].

In the scientific literature of recent years, professional self-determination is considered inseparable from personal and life, since the principle of self-development is at the heart of both. Personal self-determination as a psychological phenomenon occurs on the border of older adolescence and younger adolescence, when there is a transition from dependent childhood to independent adulthood (L.I. Bozhovich, I.S. Kon and others). Psychologists and educators rightly point out that a specific neoplasm in senior school age is an orientation toward the future, the development of a personal and professional perspective. It was during this period that the need arises for the realization of one's own «I», of one's place in this world, the installation of a teenager on personal self-determination.

N.F. Geyzhan, E.F. Zeer, N.S. Pryazhnikov, V.D. Semenov and others highlight such a necessary condition for the successful preparation of students for professional self-determination, such as the personal position of teachers who carry out this training, the help of educational psychologists, value-orientation unity of the pedagogical team and its readiness to assist students in their professional choice.

Professional responsibility of teachers, their task is to guide the development of students as future subjects of professional work, and first of all, to carry out the pedagogical guidance of professional self-determination of high school students [3].

However, studies of psychologists, sociologists, teachers show that «recently the contradictions between poorly expressed professional plans of young people and the lack of readiness of the school as a social institution to provide the necessary assistance to students in choosing their future profession, as well as the contradiction between significant uncertainties of students' knowledge about principles, rational bases, rules and conditions for solving problems of choosing a profession and achieving success in professional activities

and the urgent need and the need to choose to define themselves» [4]. These contradictions emphasize the need to determine the pedagogical conditions for preparing students for professional choice, taking into account their life experience and cultural, historical and economic situation in the country.

These contradictions have identified the **problem of research**: what are the pedagogical conditions for the successful preparation of schoolchildren for professional self-determination in the IT sphere and further socialization.

The purpose of this article is to describe the model of professional self-determination of schoolchildren in the IT sphere, which is a system for organizing the preparation of students for professional choice, taking into account their abilities, aptitudes and interests, as well as the economic situation in the country.

Testing of the proposed Model is carried out in the «School-lyceum number 101» of Karaganda.

The research methodology consisted of methods of analysis and generalization of legal documents in the field of general secondary education, as well as research works of domestic and foreign scientists in the field of student profiling and professional self-determination of students.

The model of professional self-determination of schoolchildren in the IT sphere is focused on advancing, continuous replenishment of the «baggage of knowledge», and most importantly, it takes into account the demand for new professions in the labor market.

As the President of Kazakhstan N.A. Nazarbayev noted in his speech, «Already in secondary school it is important to carry out professional diagnostics and orientation of children to the most popular specialties. This will allow to build an individual learning path» [5].

For successful education and work, a person must possess a number of competencies, among which the most important are information technology. In the modern world, possession of information technology is put on a par with the ability to read and write.

Computer science is one of the fundamental branches of scientific knowledge, forming a system-information approach to the analysis of the surrounding world. Recently, not only the general educational, but also the vocational guidance importance of this school subject has significantly increased, since the IT sector of the world economy is undergoing unprecedented development. In connection with this, the demand for IT-specialists is growing. Some specialties in the IT field, for example, a professional blogger, a seo optimizer, headhunter, and others, were not known in the early 2000s, and now they have become popular and highly paid [6].

Moreover, as noted in the Atlas of New Professions, by 2020–30 years, the number of professions requiring programming skills and, accordingly, system thinking, which is also formed as a result of learning programming, will increase significantly. Obviously, it is necessary to form new personnel today, as potential IT-specialists are now studying in high school.

The model of professional self-determination of schoolchildren in the IT sphere is based on the profiling of a coherent system of work that covers almost all participants in the educational process throughout all educational levels, including various areas and forms of activity.

Profile education is a means of differentiation and individualization of education, when due to changes in the structure, content and organization of the educational process, students' inclinations and abilities are more fully taken into account, conditions are created for the education of high school students in accordance with their professional interests and intentions regarding continuing education [7].

The main «core» of the designed model of professional self-determination of schoolchildren in the IT-sphere (Fig. 1) is the design technology, around this «core» there are 3 components: educational and cognitive, personal-social, technological.

As part of the educational component, the curriculum provides for the study of basic (according to the SES of RK) and variable subjects (elective courses, elective courses), providing an in-depth level. This component is implemented by subject teachers, school teachers of the lyceum.

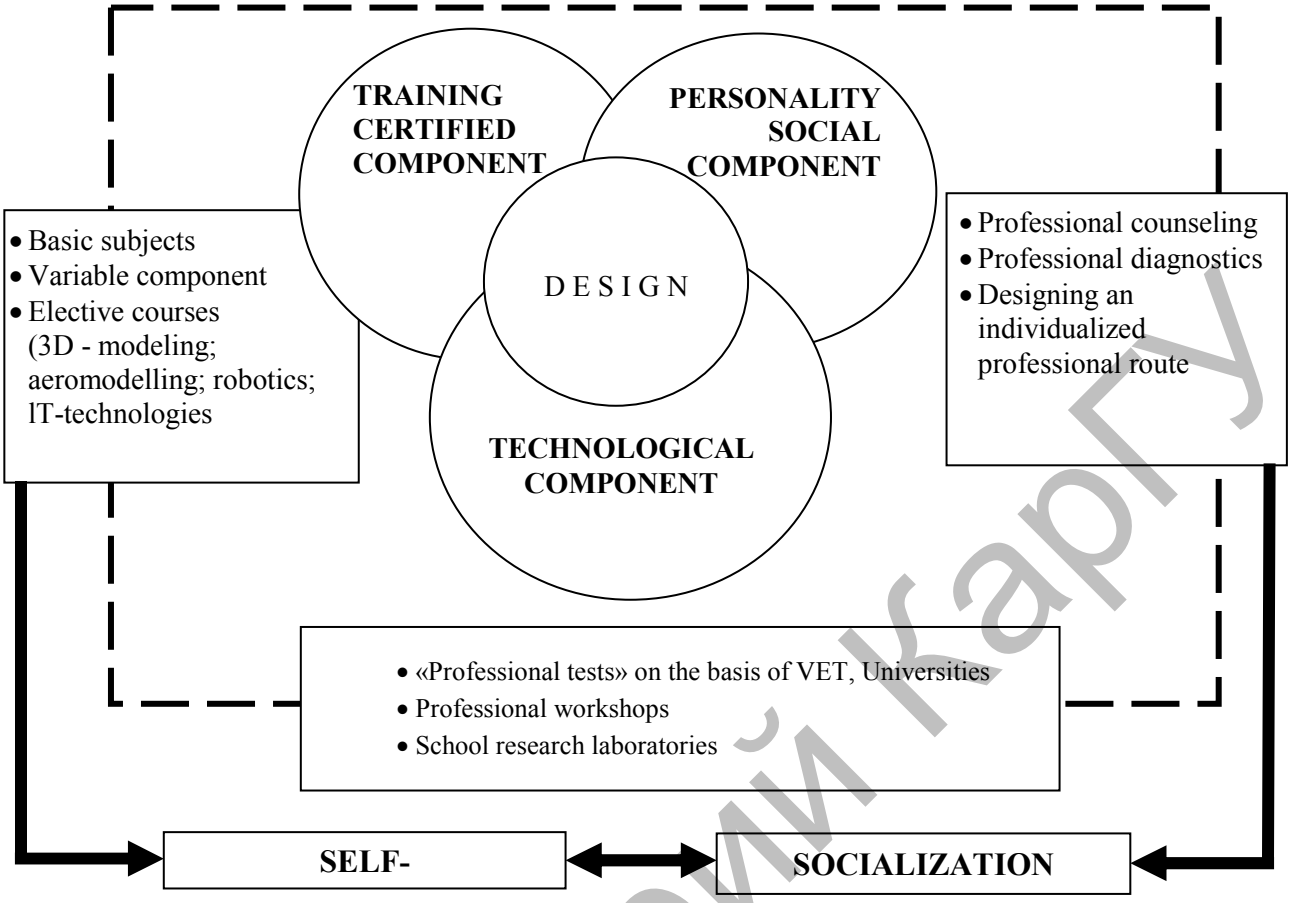

Figure 1. Model of professional self-determination of schoolchildren in the IT-sphere

The function of the *personality-social component* is to identify propensities, abilities, interests, as well as to form the whole range of semantic and professional values among schoolchildren. It is carried out by educational psychologists, social educators.

The technology component is aimed at obtaining special knowledge using «professional samples» both within the school (professional workshops, laboratories, etc.), as well as at enterprises and organizations that are social partners of the school. It is implemented by subject teachers, technology teachers.

For the formation of students' competences in the field of information technologies, we identified the following most significant methods: visualization, play and creative activity, stimulation and motivation, formation of information competence, practical, heuristic (partially exploratory), project method, methods of self-control of educational activities, use of multimedia presentations, interactive teaching methods.

At different stages of the study of the subject «Informatics» provides for the implementation of students of individual creative work, which allows to solve the problems of deeper development of the material under study and the development of creative abilities.

At the initial acquaintance with the subject, many computer science concepts are introduced at a descriptive or intuitive level. Therefore, the program has a concentric design, i.e., it contains a multiple reference to the same material at different levels of training, complication and expansion of its content.

An important resource for the successful profiling of schoolchildren is the extra-curricular work provided for by the standard, which is defined as the activity-based organization of classes based on the variable component of the basic educational (educational) plan. Within the framework of extracurricular activities, circles of interest are organized: 3D modeling, aeromodelling, unmanned control, robotics, IT technologies. This creates additional conditions for the development of the identity of the student in a variety of developing environments. In the process of performing practical and design and research work, when creating computer 3D models, students master engineering and computer programs used in enterprises, which, firstly, forms the skills of working with three-dimensional models, and, secondly, helps self-determination of students in choosing further learning paths. Training is focused on the development of technical and creative abilities, the formation of logical thinking, the ability to analyze and design.

In addition to the formation of skills in a particular area of study in circles, it is possible to study technical subjects in-depth: physics, mathematics, and computer science. Groups of several steps work in circles. Starting from 7 to 8 years of age and gradually increasing their level to the upper classes, schoolchildren can participate in scientific exhibitions and conferences, demonstrating the projects developed. Being engaged in a circle, each child can make his own discovery: invent something useful, new and creative, invent and demonstrate, explain and prove.

Aeromodelling is another technical area of circle activities that implements digitalization of education. The design of aircraft - the process of knowledge of many areas of science: aerodynamics, mechanics, materials science, electronics. The work on the construction of aircraft allows students in the form of a cognitive game to generate ideas and develop the skills necessary in later life. Here, not only the development of independent technical creativity, but also teamwork is important.

An integral part of the class is the study, step-by-step execution of instructions, during which students build models of gliders and airplanes. Simplicity, combined with the wide design capabilities of aircraft, allow pupils to see at the end of the lesson a model made by their own hands that solves the task set by them.

As part of extracurricular activities, work is also organized in groups of different age groups, which includes students in grades 5-11. At such classes, exchange of experience between the participants of groups on a pre-selected topic. Topics are determined by teachers of informatics on topical issues or offered by the students themselves. Subjects of classes were as follows: «Creating 3D images», «Working with files in the Turbo Pascal environment», «Satellite communications», «Using Java sprites when creating Web pages», «Working in MS PowerPoint», etc. At the same time plays the role of an observer or spotter.

At all stages, the student is accompanied by a teacher-psychologist (the second component of the proposed model). Conducted: the diagnosis of aptitudes and typological features of students, according to the results of the diagnosis, the design of an individual educational route, psychological consultations.

The technological component creates optimal conditions for the professional self-determination of students. «Professional» samples are provided in the framework of cooperation and networking of the school-lyceum with school technical laboratories, with higher and vocational schools, enterprises, business, etc. The project «Two weeks at the parent's enterprise» has proven itself well. One of the objectives of such a partnership is to familiarize students with how science is used in production, for example, how production technology is improved through robotization or working with CNC machines and others. Students in educational practices master the techniques of solving creative problems, modeling, designing, prototepping and programming, mastering experience in projects.

In order to assess the development of IT competencies and expand the possibility of acquiring new professions among students in the 8th grade, the ICT competition «Virtuosos at the computer» was held. Tasks for assessing the level of development of IT competencies were developed in the format of an international study ICILS.

Informatics teachers and specialists of FAO NTSP «Orleu» IPK PR in the Karaganda region compiled test tasks for IT competence levels: knowledge of standard e-mail practice (specifying recipients and sender, using the «Copies»); knowledge and application of basic navigation skills (introduction of the URL into the address bar, correct introduction and launch of a search), creation of a poster, video presentation, clip, video, flyer. The Olympiad tasks in each module were built around a single theme - the students' professional self-determination using the information resource «Atlas of Professions» developed by the Moscow School of Management Skolkovo.

For each class and for all selected IT competencies (graphical, user, and information and communication), the indicators of formation were determined incrementally, in accordance with the steps of learning.

Pupils of the 8th grades, already the second year participating in the approbation of the model of professional self-determination of schoolchildren in the IT sphere, were used as the basis for the study. Number of participants 192 people, 8 classes.

Students were offered 5 tasks. For each correctly performed task, 10 points were awarded. The maximum number of points is 50. The recommended time is 90 minutes. As a result of protocol processing, it was established that in all classes the average score was higher than the average. The minimum average score is 21, the maximum is 48. The average scores of students for the results of participation in the competition are shown in the diagram (Fig. 2).

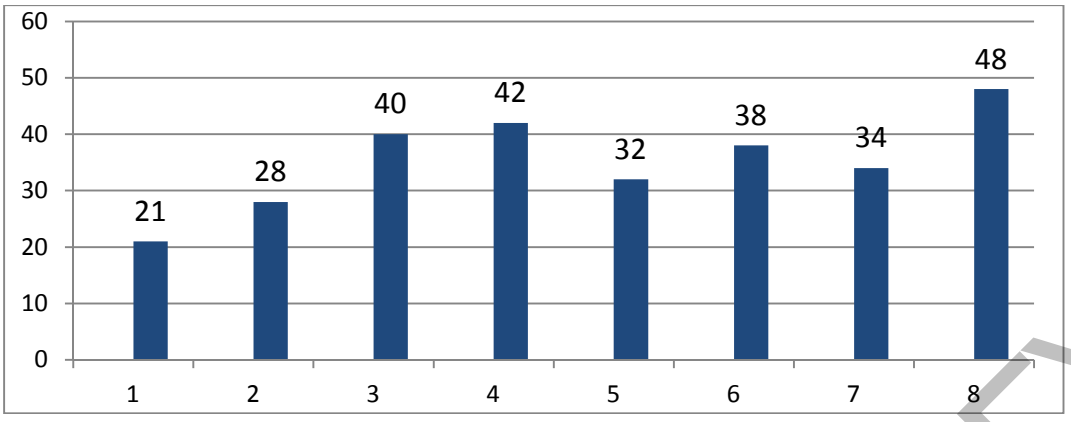

Figure 2. The results of the formation of IT-competences on the Olympiad tasks (average mark)

Disclosure of potential opportunities, the study of in-depth subjects and practice-oriented activities with network partners have allowed students of the school-lyceum to achieve the following results:

– in the project «Engineers of the Future»: in 2017, following the results of the regional competition of engineering and computer three-dimensional modeling, they were awarded a Diploma and a Diploma of 3rd degree in the nomination «Tehnikalyq Oryndau»;

– in the regional competition in robotics awarded the Diploma of III degree;

– in the competition of technical creativity - Diploma «I-Robot»;

– in 2018 became winners of the International Engineering 3D Modeling Competitions in St. Petersburg, at the IV International Festival in Robotics;

– in the competition on programming and innovative technologies in the city of Karaganda won Diplomas of the 2nd and 3rd degree.

As a result of the experimental work, students learned to understand the importance of information technology in society and their own lives. Pupils have developed a need for a new type of social awareness of studies and the world, a subjective attitude to the study of computer and information technologies, the ability to use ZUN in the field of informatics and ICT not only in the classroom, but also in life situations, in practical activities, which testifies to their competencies.

Interpretation of the results allows us to conclude that the early start of the formation of IT competencies ensures higher achievements of students, since the development of IT competencies at the level above the average is a factor in the success of training in this field. This in turn contributes to the formation of professional intentions, professional self-determination and the training of older students.

Conclusion

This paper is devoted to the actual problem of the formation of professional self-determination of high school students in the IT sector. The Model of professional self-determination of schoolchildren in IT-sphere is presented, the feature of which is the interrelation of 3 components: educational and cognitive, personal-social and technological.

The results obtained in the process of testing this model make it possible to predict the possibility of its successful implementation in schools. The use of the proposed model will provide the necessary conditions for the high quality of education through the use in the educational process of new educational approaches, information and communication technologies. All this will contribute to the purposeful preparation of young people for the conscious choice of their future profession, which can be considered the key to success in their subsequent work activities.

The direction of further research we see in the search for methods to assess the effectiveness of this model.

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К.А. Таженова, А.С. Кудусов, Р.К. Казтаев, Г.К. Ибрагимова

IT-саладағы оқушылардың кәсіби өзін-өзі анықтау моделі

Мақалада IT-салада оқушыларды кәсіби бейіндеудің моделі ұсынылған. Ондай үлгі оқушылардың кәсіби мамандық таңдауда олардың қабілеті, қызығушылығы және бейімділігін және еліміздің экономикалық ахуалды есепке ала отырып дайындау ұйымдастыру жүйесі болып табылады. Зерттеу әдіснамасы ретінде жалпы орта білім саласындағы нормативтік-құқықтық құжаттарды талдау мен жүйелеу әдістері және оқушылардың кәсіби өзін-өзі бейіндеу және отандық ғалымдардың ғылыми-зерттеу жұмыстары құрайды. Қолжеткізілген нәтижелер аталған үлгінің мектептерде сәтті жүзеге асыруды болжауға мүмкіндігін болжауға негіз береді. Осылардың бәрі жастарды болашақ мамандықты саналы түрде таңдауға мүмкіндік береді, яғни оларды еңбек іс-әрекетінде табысқа жету кепілі ретінде есептеуге болады.

Кілт сөздер: бейіндеу, IT-сала, оқушылардың кәсіби өзін-өзі анықтау моделі, сабақтан тыс іс-әрекет.

К.А. Таженова, А.С. Кудусов, Р.К. Казтаев, Г.К. Ибрагимова

Модель профессионального самоопределения школьников в IT-сфере

В статье представлена модель профессионального самоопределения школьников в IT-сфере, которая представляет собой систему организации подготовки учащихся к профессиональному выбору с учетом их способностей, склонностей и интересов, а также экономической ситуации в стране. Методологию исследования составили методы анализа и обобщения нормативно-правовых документов в сфере общего среднего образования, а также научно-исследовательских работ отечественных и зарубежных ученых в области профилизации обучения и профессионального самоопределения учащихся. Полученные в процессе апробации данной модели результаты позволяют прогнозировать возможность ее успешной реализации в школах. Все это будет способствовать целенаправленной подготовке молодежи к сознательному выбору будущей профессии, что можно считать залогом успешности в последующей трудовой деятельности.

Ключевые слова: профилизация, IT-сфера, модель профессионального самоопределения школьников, внеурочная деятельность.

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