Application of Modern Information Systems in the Framework of the Educational Course "Self-Determination and Professional Orientation of the Student's Personality"

Anna V. Tukshumskaya[1], *Tatiana N.* Popova[2], and *Natalia Y.* Tihanova[3*]

[1]Moscow Pedagogical State University, M. Pirogovskaya str.1/1 , Moscow, 119991, Russia
[2]Togliatti State University, Belorusskaya str., 14, 445020, Togliatti, Russia
[3]Bauman Moscow State Technical University, 2nd Baumanskaya str., 5/1, 105005, Moscow, Russia

Abstract. This publication reveals the possibilities of using modern information technologies as a part of the educational process at the university. The authors analyze the modern information technologies used in higher education. The paper formulates the didactic principles of applying modern information technologies and determines their significance. Information technologies implemented in the framework of the educational course "Self-determination and professional orientation of the student's personality" are examined in detail. The paper describes the conditions for the implementation of this discipline and detailed steps for constructing it within the educational process. It also provides an analysis of the InfoDa distance learning system which is implemented at the FSBEI HE "Moscow State Pedagogical University" and allows running the entire training cycle, starting with the presentation of lecture material and ending with the monitoring of acquired knowledge and skills. Possibilities and features of the application of the InfoDa system are presented on the example of the educational course "Self-determination and professional orientation of the student's personality". The paper also shows the effectiveness of using the InfoDa system as modern information technology in the educational process. The conclusion is clear that modern information technologies make the educational process more productive, having a positive effect both on the level of students' knowledge and on the formation of professionally important competencies.

1 Introduction

Changes in the socio-economic life of modern society could not but entail changes in the field of education. Today, the educational process in higher education requires significant changes due to a reassessment of values and a shift in socio-economic and political paradigms. The improvement of the educational process goes along the path of changing its content, forms and methods of educational activity and its control. According to this, the

* Corresponding author: tikhanov@bmstu.ru

provision of the educational process should be carried out taking into account the transformation from the learning object to the conscious subject of educational activity.

In accordance with the federal state educational standards of higher professional education (FSES HPE), the students' training in any specialty involves the formation of certain competencies that determine the most effective implementation of future professional activities. In addition to knowledge, abilities and skills, the content of competencies includes personal qualities that also contribute to the high-quality implementation of professional functions, which, in turn, are determined by the goals, objectives, and requirements of the appropriate production field.

Readiness for competent employment implies the formation of effective working life motivation and the ability to search for creative solutions for work tasks. In the course of professional training, young specialists should develop not only knowledge, as well as skills that will enable the university graduate effectively implement them in the future profession, but also the ability to easily orient in related areas of professional activity.

Among the obvious educational mechanisms (financial, institutional, regulatory), it is also possible to see indications of a specific organizational resource associated with the use of information technologies, which, of course, affects the quality of the educational process [1]. All of the above was the conceptual framework of our study, aimed to study the effectiveness of building the educational process implementing modern information educational technologies [2].

Thus, as a problem of our research, we can single out the following: what is the impact of modern information technologies on the level of students` knowledge?

After analysis of different studies on this issue, we suggested that the use of information technology affects both the level of knowledge among students and the formation of professional competence of graduates in the system of higher professional education. The technology contributes to the development of creative thinking and the acquisition of self-education skills in various activities, consisting of the search, evaluation and further use of the necessary information [3].

2 Main part

Figures A distinctive feature of the higher education modernization is a change in the content of education and teaching technology, including the usage of modern information technologies.

At the present stage of information technology development we can distinguish:

- wide distribution and accessibility of information resources and Internet services (at all levels of education),
- active involvement in the educational process of multimedia teaching aids,
- continuous development of new electronic tools and technologies as a part of the implementation of educational activities.

Simultaneously with the development and readiness to use information technologies in education, there is an increase in the requirements for the content of general cultural and professional competencies that are necessary for the successful self-realization of a future university graduate. All this requires the development of a high-quality electronic information educational environment in high school, the creation of levers for its effective use and well-organized personnel support. Informatization of the educational process acts as a tool of accessibility of modern and high-quality education, which is especially valuable in conditions of mass public interest in self-education or "education throughout life."

Several areas are highlighted during the process of creating an educational environment with electronic information in a university.

1. Creation and continuous modernization of information and communication infrastructure (IC infrastructure).

Today, all higher education institutions more or less equipped with IT devices (computers, software, copying equipment, multimedia and projection equipment, etc.). The process of transition to "cloud" technologies begins, allowing coping with the growth of information systems and the complexity of their operation.

Hence it seems necessary to introduce new ways of organizing IC infrastructure based on the concentration of high-tech operations, software, and qualified personnel within specialized data centers. The infrared in such way infrastructure will simplify, reduce the cost and unify the devices and methods of users' work by integrating personal computers of all interested participants in the educational process: teachers, students, parents, etc. A prerequisite for the optimal organization of IC infrastructure is the presence of a telecommunication environment with high capacity.

2. Formation of electronic educational content and ensuring free access to it.

This direction includes the formation of a system of electronic educational resources and ensuring free access to them. This includes electronic teaching aids, electronic versions of textbooks and manuals, reference books, tests, etc. In many institutions of higher education, electronic educational and methodological complexes have been created and placed in the public domain. For example, in Bauman Moscow State Technical University electronic systems provided virtually all the disciplines taught at the university.

There are some practical problems at the background, although it is possible to outline the tasks of increasing the efficiency of using electronic educational content, that consists from expanding the accessibility and improving the quality of created and implemented electronic educational resources, which are based on their role in the educational process and the target load. The active use of electronic educational resources is focused primarily on independent work at home or in an educational institution.

An important component of electronic educational content is to ensure that the content of modern educational resources are interconnected with educational automation tools (electronic journals, load calculation, scheduling, etc.). An example of such automation is the "Electronic University " system, developed at Bauman Moscow State Technical University and allowed moving to full electronic office work.

3. Development of an interaction system between participants in the educational process, including electronic document management and management systems.

4. Human resources, which implies the ability and willingness of teachers to use information technology during the educational process and conducting training sessions (IC competency).

The formation of IC competence requires a change in the tendency of teachers' advanced training, including overall implementation and frequency requirements.

The application of the informatization process in higher education requires comprehensive measures that develop each of the above areas and take into account their correlation.

Considering modern information technologies, we proceed from the fact that the technologies can be described as software and technological tools that have a methodological purpose for ensuring the accessibility of the educational process. Information technologies are being introduced into the vocational education system to increase the effectiveness of the educational process aimed at the formation of a professionally and socially competent person [4].

In turn, we can attribute to modern information technologies the following ones:

- computer training programs;
- multimedia technologies;
- distance learning technology.

Electronic as a part of supporting the educational process plays a very important role in information educational technologies and can take a variety of forms: electronic educational software products, electronic textbooks, evaluative materials or reference books in electronic form, interactive models of processes and systems, etc. The development of computer training programs, supporting the learning process in recent years has become one of the priority areas for improving the quality of education.

Information systems and their structural elements such as hypertext and multimedia content can be represented by a combination of text, audio and video information, animation, etc. in different variations. Using color computer animation and graphics, video sequences and presentations (diagrammatic, formulaic, reference), it is possible to present the training material in the form of a sequential (branching) chain of dynamic pictures with the possibility of returning to information blocks that implement other designs or processes.

The non-linear organization of information units also can be interesting. A flexible and friendly form of non-linear control of such units coupled with an intuitive interface, which allows you to evaluate multimedia systems as a means to increase the development efficiency of various fields of science and technology.

Multimedia technology allows us to make the presentation of didactic materials as convenient and visual as possible, which can stimulate interest in learning and eliminates knowledge gaps. At the same time, to make implementation more efficient, multimedia systems should be and technically can be equipped with effective evaluative tools, including also a process of monitoring acquired knowledge and skills.

Modern institutions of higher education are increasingly using information technology and computer telecommunications. A distance education system is developing, which emphasizes independent work in the study of compulsory and optional subjects.

The introduction of the distance learning platform in modern conditions has become quite widespread in higher education institutions and the system of additional education of adults. Representing a promising future-oriented project, the direction of distance education requires special management, support, new methods and quality control of the learning process. The implementation of distance learning technologies can only be based on the use of high-tech platforms.

Distance education technologies have naturally led to technology development which means the rapid collection, processing, and transmission of information, equipping universities with powerful computer technology and Internet communications.

Nowadays the following distance learning technologies can be distinguished:

- Correspondent education - technology where each student is assigned a personal teacher, and the learning process is conducted through their interaction using technical means (for example, by correspondence),
- SL8B-technology - a technology used when a complete set of training materials is needed to master a particular discipline or its subject area,
- TV-technology - technology based on the use of television equipment and television communication channels,
- network technology - a technology based on the use of computer equipment and computer communication channels.

The phenomenon of distance education is considered in numerous Russian and foreign studies related to various aspects, from highlighting features to identifying problems of the practical implementation of distance learning.

The undoubted advantages of distance learning, which gave it an ability to take place in modern pedagogy, are:

- the ability to independently determine the way of learning and the speed of studying,
- accessibility (especially for education people with disabilities),

-time-saving, since distance learning does not imply a daily visit to an educational institution and classes,

- reduction in financial costs.

In the analysis and generalization of specialized literature, there were identified the problems of distance learning such as:

- limited capabilities of technical means (for example, for the introduction of network or TV technology of distance education, each student at the university must have the appropriate equipment, software and communication channels),

- distance learning, in contrast to the traditional one, is aimed at acquiring knowledge, abilities and skills and, due to the uniqueness of its nature, cannot contribute to the upbringing and socialization of the individual.

As we can see distance learning can be considered as a promising direction. This method of obtaining an education is very convenient for people who want to master the educational program in interesting training areas (specializations), but are not able to leave their place of residence or leave their work, do not have enough time or financial resources, and also for people with disabilities.

For the quality of education, in our opinion, distance learning can be used effectively only in the case of a formed cognitive need, and motivation for self-organization of the educational process. In psychological and pedagogical studies, one way or another touching upon the problem of motivation for educational activity, the connection between the motivation of the subject of training and the skills mastery level of the independent organization of educational work has been repeatedly confirmed. As far as the student will tend to be persistent in mastering the educational program, he will present himself as a self-organized successful person, capable of setting goals and competent planning within the educational process. At the same time, there are doctrinal factors to identify patterns of personality self-organization, classification and separate consideration of cognitive and social motives, their psychological characteristics, etc.

It must be noted that nowadays distance learning is not able to provide full-fledged mass education and is more suitable for receiving additional education.

In the field of education, information technologies are used to solve two main tasks: training and management. In this regard, we can argue that information technology involves:

- presentation of the studied material in the form of presentations, using a graphic, animation, audio and video objects, which, fully realizing the didactic principles of accessibility and visibility, can significantly increase the degree of perception, understanding, and assimilation of educational information [5];

- access to educational and reference materials posted on the educational institution server;

- interactive communication of teachers and students in the learning process, in which the student becomes a full participant in the process of perception and cognition [6];

- the possibility of independent work with various external information resources;

- continuous monitoring and evaluation of knowledge and skills acquired by students in the learning process via systems of testing.

Speaking about the use of modern information technologies in education, it is necessary to pay special attention to observing the didactic principles, whereas it is possible to attribute the following:

1. Motivation in the use of various didactic materials, which, in turn, directly depends on the general level of organizational culture at the university [7] and the degree of development of its intellectual infrastructure [8].

2. A clear definition of the role, place, purpose and time of the information technology use. Moreover, the modeling of the learning process using information technology can occur based on the developed tools for collecting educational data [9].

3. The leading role of the teacher in classes. The teacher as a key figure in the educational process (especially if information technology is involved) must meet the requirements of innovation and creativity, which necessitates the creation of effective management and economic mechanism for the teachers' training [10] and improving the quality of education [11]. The process of globalization necessitated the mastery of university teachers by the skills of intercultural communication in their professional activities [12].

4. Correspondence of information teaching methods to the general strategy for conducting a training session, taking into consideration the essential features of specific training areas (specialties) [13].

5. Information educational technologies require a review of all system components and changes in the general teaching methodology and final control.

6. Ensuring a high degree of individualization of education, at least based on gender differences in the students' thinking [14];

7. Providing sustained learning feedback.

This study is relied on the educational course "Self-determination and professional orientation of the student's personality", which is implemented in course 44.03.02 "Psychological and pedagogical education" at the faculty of pedagogy and psychology of Moscow State Pedagogical University.

The main goal of the educational course is to provide students with knowledge in the field of professional self-determination and career guidance.

This course is intended to form such competencies as:

- Ability to use psychological and pedagogical skills in professional activities that are necessary for the individualization of training, development, education, including students with special educational needs (OPK-6);
- Possibility to provide students, including children with disabilities, with support in designing the activities of children's public associations in an educational organization (PK-2);
- Opportunity to participate in the planning and realization of work to identify family problems in different types of families (PK-4);
- Ability to organize and study socially and personally significant activities of a group of students, including children with disabilities (PK-5).

As a result of mastering the discipline, the student must:

- Know the diversity and orderliness of the professions; the essence, structure, methods, age and social characteristics of students' professional self-determination, criteria for its effectiveness; strategies, forms, methods, and means of its psychological and pedagogical support; the basics of organizing and conducting career guidance work at school; have an idea of the relationship of professional and social self-determination, professional development and formation, professional activities.
- Be able to plan and carry out career guidance work at school (in lessons, in extracurricular activities, coordination of joint activities of the teaching staff, interaction with parents, interaction with various institutions).
- Own a complex of forms (educational, game, training), methods and tools (diagnostic, informational, developing, etc.) of psychological and pedagogical support of students' professional self-determination and determination of its adequacy.

The main topics of the discipline are profession and areas of professional activity. Professional self-determination of personality. The personality of the student in the system of career guidance [15].

Various educational technologies are used as a part of this educational course. These are a problem lecture, business games, testing, analysis, a biographical method and so on.

To date, the Moscow Pedagogical State University has developed and successfully implements the distance education system called InfoDa, which effectively complements the learning process. This information environment allows conducting the entire training cycle from lecture material to the final exam. The teacher can deliver lectures in the form of presentations, supplementing them with video materials, regulatory documents, and all the necessary teaching aids, as well as to conduct questionnaires, testing, essays, and research projects as part of practical classes [16]. Additionally, the teacher can regulate the time frame. At the same time, the student can always ask clarifying questions to the teacher. Thus, there is positive communication between participants in the educational process [17]. From our point of view, this system allows the teacher and student to interact productively, which is its indisputable advantage.

The use of the InfoDa distance education system in the educational course "Self-determination and professional orientation of the learner's personality" occurs within the framework of practical exercises, where students are given the following tasks.

1. Writing an essay on the following topics:

"What is a profession", "Me and my profession"; "Psychological aspects of the profession"; "The main differences between the existing types of professions, their advantages and disadvantages"; "To analyze the profiles of the professions "psychologist", "social worker", "professional consultant". These tasks contribute to the formation of such competencies as OPK-6; PK-4.

2. Preparation of presentations on the topics: "The modern job market and socio-economic trends of its development"; "The role of cultural-historical and socio-economic conditions in the professional self-determination of a person"; "Socio-psychological and occupational features of professions"; "The role of personal qualities in professional activities." "Methods of career guidance assistance of different ages." All these tasks form OPK-6; PC-2 and PC-5.

3. Analysis of articles in periodicals over the past year on the topic "Professional orientation of students." These tasks are aimed to build the competence of OPK-6.

Besides, there are the following tasks (cases) for students:

Case "Job center"

Description of the situation: Olga Petrova, a student of the 9th grade of the secondary school No. 1 came to the Job Center. The girl successfully mastered school subjects during studying at school. By nature, she is calm and balanced. She takes responsibility for studying, shows a desire to study as a cook, which she really likes to do. Olga is interested in: "Is the profession that she chose in demand on the job market in our city? Is there a growing demand for workers, how much in demand are people who have received working professions? "

Assignment: Think about whether the working professions are in demand in our city, argue your opinion, taking into account the presence of enterprises in the city. Make a list of the ranking of demanded occupations in the job market. Hold an informational conversation with Olga Petrova on the topic: "The demand for the profession of a cook".

Case "Family".

Description of the situation: Pyotr Ivanov, 15 years old, from a working family, a successful student in his school. Peter decided to enter a vocational school and get the profession of a carpenter. He is fond of woodcarving, likes to make crafts, interested in modeling from various materials. When choosing a profession, Peter didn`t focus on its prestige; he believes that it is necessary to choose the profession in which you can make your personal contribution and prepare yourself for activities that bring a high level of

income. However, parents insist on choosing a profession in law, as they are lawyers and believe that it is prestigious.

Assignment: Think about whether you agree with the opinion of the parents of Peter Ivanov? Argument your opinion. Make a motivational conversation with the parents of Peter Ivanov regarding the choice of the profession of a carpenter and its prestige.

Case "Future hairdresser."

Description of the situation: Lyudmila Ilyina, 14 years old, dreaming of working in the service sector. She studies at school number 32 and chose the profession of a hairdresser. By nature, she is a calm, unsociable, reserved girl, has a narrow circle of friends. In the classroom, she takes an observer position, does not take part in the public life of the school. Lyudmila has creative abilities. She likes to do hairstyles and makeup. However, the communicating difficulties prevent her from mastering the profession of a hairdresser.

Assignment: Think about the professionally important qualities that Lyudmila needs and how they can be developed. Develop and conduct exercises with Lyudmila, aimed at developing these qualities that correspond to the profession of a hairdresser.

It is an important notice that the above tasks were tested at the Center for Career Guidance based on the Municipal Autonomous Organisation of Continuing Education and Training "Leningrad Training Center" of the Leningrad Region. This is only a small part of our work with students that use the InfoDa system in the framework of practical classes of the discipline "Self-determination and professional orientation of the student's personality."

As it has been said earlier, these tasks are aimed at the formation of both general professional and professional competencies provided by the curriculum and prescribed in the course program. Besides, the main goal of this course is achieved, which is the acquisition by students of knowledge in the field of professional self-determination and career guidance with a student [18], [19]. On the whole, the InfoDa distance education system involves moving away from abstract methods of teaching science using the cognitive methods inherent in scientific research, which gives an ability to define it as a research model of education in the context of a social movement towards education [20, 21].

3 Conclusion

The cognitive process with the implementation of modern information technologies is steadily becoming a powerful tool in advanced educational institutions to effectively improve the quality of education, which has wide possibilities to optimize the building of the cognitive process and to allow the learning subject directly engage in a topic of interest, owing to its interactivity.

Based on the results of control sections and the final certification in the discipline "Self-determination and professional orientation of the student's personality," we can argue that the training material is absorbed more efficiently using various educational technologies, in particular information technologies.

In this regard we can say that modern information technologies make the educational process more productive, exerting a positive impact both on the level of students' knowledge and on the formation of professionally important competencies. Today a modern graduate needs to possess a large amount of knowledge to successfully interact in the pedagogical, methodological, research and management spheres, reflecting both individual and professional needs [22] and improving communication skills [23].

References

1. Matteo Cristani, Michele Manzato, Simone Scannapieco, Claudio Tomazzoli, Stefano-Francesco Zuliani, *Automatic Clustering of User Communities*. URL https://link.springer.com/chapter/10.1007/978-981-13-8679-4_6.
2. A.V. Tukshumskaya, *The formation of a culture of interpersonal relations in the teaching staff of the school: technology, criteria, research results*, Education and quality of life, No. 5, pp. 9-13 (2018)
3. N.S. Schutte & J.M. Malouff, *Connections between curiosity, flow and creativity*, Personality and Individual Differences, 152 (2020). doi:10.1016/j.paid.2019.109555.
4. M.G. Sergeeva, N.N. Bedenko, L.Z. Karavanova, T.Y. Tsibizova, I.S. Samokhin & M.S. Mohammad Anwar, «*Educational company» (technology): Peculiarities of its implementation in the system of professional education*, Espacios, 39(2) (2018)
5. T.Y. Tsibizova, V.M. Postnikov & S. B. Spiridonov, *Analysis of the impact of technology lectures-visualizations on the results of control measures in various academic disciplines*, PerspektivyNaukiiObrazovania, 33(3), pp. 358-363 (2018)
6. A.A. Sherstobitova, L.V. Glukhova, I.G. Sergeev & N.Y. Tihanova, *The remote process support for collaborative work* (2019). doi:10.1007/978-981-13-8260-4_55.
7. E.V. Endovitskaya, *Formation of organizational culture that stimulates innovativeness and creativity of personnel* (2020). doi:10.1007/978-3-030-15160-7_88.
8. Y.S. Mitrofanova, A.A. Sherstobitova & O.A. Filippova, *Modeling the assessment of definition of a smart university infrastructure development level* (2019). doi:10.1007/978-981-13-8260-4_50.
9. Y.S. Mitrofanova, A.A. Sherstobitova & O.A. Filippova, *Modeling smart learning processes based on educational data mining tools* (2019). doi:10.1007/978-981-13-8260-4_49.
10. S.A. Gudkova, T.S. Yakusheva, A.A. Sherstobitova & V.I. Burenina, *Modeling, selection, and teaching staff training at higher school* (2019). doi:10.1007/978-981-13-8260-4_54.
11. M.G. Sergeeva, N.N. Bedenko, T.Y. Tsibizova, M.S. Mohammad Anwar & T. G. Stanchuliak, *Organisational economic mechanism of managing the growth of higher education services quality*, Espacios, 39(21) (2018)
12. S.A. Gudkova, T.S. Yakusheva, A.A. Sherstobitova & V.I. Burenina, *Modeling of scientific intercultural communication of the teaching staff at smart university* (2019). doi:10.1007/978-981-13-8260-4_48.
13. O.M. Shcherbakova, O.Yu. Otrokova, V.I. Burenina, "Russian method" of training engineering personnel: historical experience and modernity, Social Science, Education and Humanities Research Proceedings of the 4th International Conference on Contemporary Education, Social Sciences and Humanities (ICCESSH 2019), pp. 645-650 (2019)
14. A. Abraham, K. Thybusch, K. Pieritz & C. Hermann, *Gender differences in creative thinking: Behavioral and fMRI findings*, Brain Imaging and Behavior, 8(1), 39-51 (2014). doi:10.1007/s11682-013-9241-4.
15. Nahla Aljojo, Areej Alshamasi, Huda Saifaddin, Najla Saeed, Reem Zahir, Shahrazad Mustafa, *Finding a Career that Fits Your Personality*. URL: https://www.researchgate.net/publication/283754906_Finding_a_Career_that_Fits_Your_Personality.

16. P.P. Baranov, A.Yu. Mamychev, A.A. Plotnikov, D.Yu. Voronov, E.M. Voronova, Problems of legal regulation of Robotics and Artificial Intelligence in Russia: Some approaches to the solution, DilemasContemporaneos-EducacionPolitica Y Valores, Vol. 6, No. SI, Article number 34 (2019)
17. T.P. Skorikova, S.S. Khromov & N.V. Dneprovskaya, *Distance learning in scientific and professional fields of communication (interdisciplinary approach)*, International Journal of Environmental and Science Education, 11(10), pp. 3467-3476 (2016)
18. Abdellah Chehri, Hussein T. Mouftah, *Internet of Things – integrated IR-UWB technology for healthcare applications*. URL: https://onlinelibrary.wiley.com/doi/full/10.1002/cpe.5454.
19. Remke Klapwijk, ElsRommes, *Career orientation of secondary school students (m/f) in the Netherlands*. URL: https://link.springer.com/article/10.1007/s10798-009-9095-7.
20. A.O. Karpov, *Education in the knowledge society: Genesis of concept and reality*, International Journal of Environmental and Science Education, 11(17), pp. 9949-9958 (2016)
21. A.O. Karpov, *Socialization for the knowledge society*, International Journal of Environmental and Science Education, 11(10), pp. 3487-3496 (2016)
22. T.N. Popova, O.V. Dolghenko, *The importance of language training in the life of a future specialist*, Actual problems of theoretical and applied linguistics and optimisation of teaching foreign languages: proceedings of the V international scientific. Conf., Togliatti, October 6-07, 2016 Togliatti: Publishing House of the Togliatti State University, pp. 159-165 (2016)
23. T.N. Popova, *The problem of the formation of professional foreign language communication among bachelor students in the framework of the subject foreign language*, Actual problems of theoretical and applied linguistics and optimization of teaching foreign languages: proceedings of the VI international scientific. Conf., Togliatti, 11-12 October 2018 Togliatti: Publishing House of the Togliatti State University, pp. 117-123 (2018)