Training of the Future Teacher in Applying Digital Tools for the Organization of Project Activities[*]

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Abstract. The article examines the issues related to the organization of the project activities of students, analyzes the approaches and peculiarities regarding the use of the project method in the training process, and considers modern digital tools for the activation of project and research activities. The article gives a review of digital tools, which are consistent for the effective organization of project activities, increasing motivation of students at various stages of work on the project. The article shows that the use of digital tools to organize the project activity allows increasing the effectiveness of the pedagogical process, helps to create optimal conditions, and obtain high-quality educational results. Along with the advantages, the article touches upon the challenges of using digital tools in project activities. In this regard, it can be noted that on the one hand, there may be insufficient digital competence of the teacher and/or students, on the other hand, - excessive use of digital tools in the training process, contrary to sanitary rules and regulations. For the effective organization of project training using modern digital tools, we have developed the educational and methodological support and distant support of the discipline "Technologies for project training in informatics and ICT". We have conducted a pedagogical experiment, which testifies the high effectiveness of the technology given to form the professional competence of the future teacher in organizing the project activities of students using digital tools.

Keywords: Digital Tools, Project Activities, Project Method, Digital Competence, Information and Communication Technologies, Training of the Future Teacher, Distant Support of the Course.

1 Introduction

The rapid development of digital technologies, further expansion of information space demands new solutions for modern education, changing the content, methods, means, and forms of learning. The teacher needs to teach the student to analyze information, put forward hypotheses, make conclusions, and make research. Innovative means of learning can be digital tools that not only develop the creative activity of students but

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also effectively organize their independent work by intensifying research, information retrieval, and analytical methods. The use of digital tools contributes to the development of the student's personality, helps develop critical thinking, creativity and activates students' independent work.

The purpose of the article is to describe the technology of forming the professional competence of the future teacher in organizing the project activities of students using digital tools.

2 Problem Statement

The reform of education, the introduction of educational standards created the need to develop and use new forms and methods of organizing the educational process. One of the effective and innovative tools in such an environment is the use of new digital technologies and their tools to educate a creative person who knows how to use research, information, search, and analytical methods with various information in educational and independent activities.

The Federal State Educational Standard of the new generation provides for the organization of project training based on the application of active methods and forms, modern pedagogical technologies, and means [1]. Project training combines all modern activities of the student: helping to move from the inception of a creative idea to its actual realization. This ensures the intellectual, physical, and social development of the student in the education system.

The difference between project training and other forms of educational process organization lies in the fact that it allows developing and improving the skills of model building, process design, forming the cognitive and creative orientation of the student's personality, that is, contributing to its holistic development [2].

It is advisable to use digital tools such as interactive applications, mental maps, mobile technologies [3], augmented and virtual reality tools for the effective organization of project activities [4, 5], increase the motivation of students at various stages of the project. For example, the use of virtual and augmented reality technologies, as a powerful visualization tool and an effective way to provide information to students, modernizes the learning process, including new tools and methods, expanding didactic and cognitive capabilities [6].

Digital tools can be used in various technological aspects [7]:

1. "Penetrating" technology, when different digital tools are used at all stages of the project, to solve individual didactic problems.

2. The "core" technology in which the most significant of the digital tools used plays a decisive role.

3. "Monotechnology," when the management and organization of project activities, including all stages of design, is based on the use of a single digital tool.

The methodically substantiated and expedient use of digital tools in the project activity allows you to organize an effective pedagogical process, helps to create optimal conditions, and obtain high-quality educational results [8].

The advantages of the project activity of students using digital tools are that conditions are created for solving various pedagogical problems: individualization of training and increasing the volume of tasks completed; intensifying the independent work of students [9]; enhancing visual aspects; increasing cognitive activity and motivation through various forms of work, including play, taking into account the age characteristics of children; development of creative and research abilities [10, 11].

Along with the advantages, there are existing problems with the use of digital tools in project activities. In this regard, it can be noted that, on the one hand, there may be insufficient digital competence of the teacher and/or students, on the other hand, excessive use of digital tools in the teaching process contrary to sanitary rules and standards [12, 13]. In this case, there is a possibility that carried away by the use of digital tools in project activities, the teacher will switch from developmental training to a visual illustrative method.

3 Development of Distance Learning Course

To effectively organize project training using modern digital tools, the future teacher needs to have certain knowledge, as well as practical skills in this field [14, 15]. To this end, the discipline "Technologies of project training in informatics and ICT" has been introduced into the educational program for the direction of training 44.03.01 "Pedagogical education." We have developed educational and methodological support for this discipline, which includes annotation and a working program of the course, a course of lectures, methodological recommendations for laboratory work, tasks for independent execution, assessment regulations, and distant support of the discipline.

The goals of mastering the discipline "Technologies of project training in informatics and ICT" are the formation of a set of professional competencies of the future bachelor's degree in the field of training 44.03.01 Pedagogical education, orientation (profile) "Informatics and information technologies in education" in the field of using modern digital tools in designing the process of teaching informatics and ICT and organizing the project activities of students.

The main tasks of the training discipline are:

- mastering the theoretical foundations and methodology of pedagogical design using digital tools;

- study of pedagogical and methodological possibilities of using digital tools in designing the process of informatics subject training;

- mastering the skills of developing electronic teaching materials using modern digital tools.

Distant support of the discipline "Technologies of project training in informatics and ICT" has a modular structure and consists of eight modules:

1. Training using the project method.
2. Planning the training project.
3. Organize project collaboration on the Internet.
4. Creation of students' project activities products.
5. Evaluation of students' project activities.

6. Planning the successful work of students on the project.

7. Creation of materials for maintenance and support of project activities.

8. Project Portfolio presentation and defense. Each module has its topic for study, which contains theoretical material, practical tasks, during which trainees learn the skills of organizing project activities using digital tools, develop professional competencies (see Fig. 1).
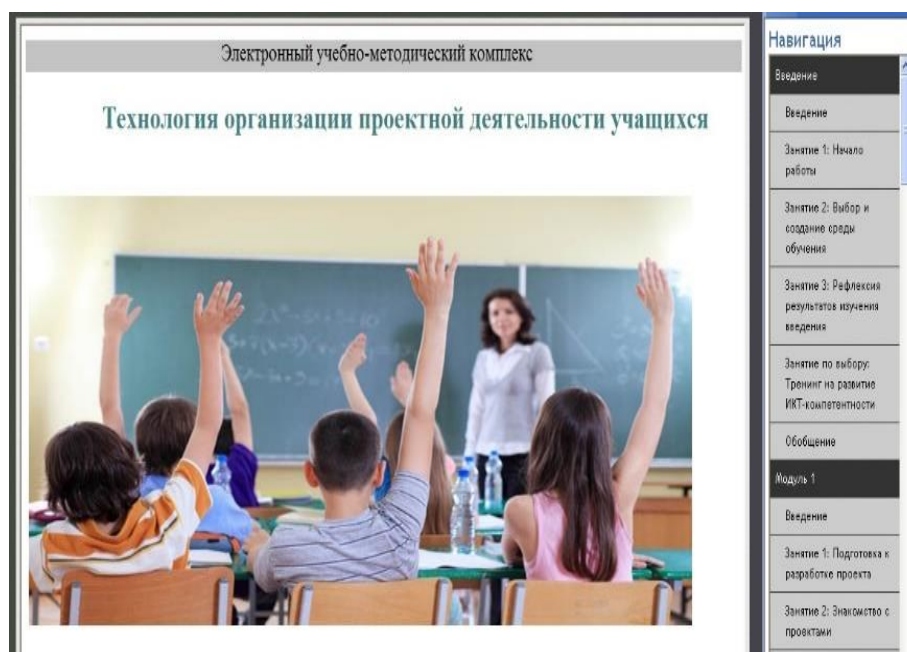
Fig. 1. The structure of distant support of the discipline "Technologies of project training in informatics and ICT".

For citations of references, we prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], as well as a URL [5].

4 Diagnostic Procedure

To pilot the effectiveness of the project activities of students using digital tools, we have conducted a pedagogical experiment, which consisted of the following stages: ascertaining, formative, and control.

At the first - ascertaining stage, a summative assessment of the initial level of preparation of future teachers for the organization of project training was carried out.

At the second - formative stage, a training and education system was implemented to prepare future teachers for the organization of project training using modern digital tools, including the mastery of the course "Technologies for project training in informatics and ICT," followed by the application of the acquired knowledge in the course of pedagogical practice.

At the third - control stage, the proficiency of future teachers for the organization of project training using modern digital tools was re-assessed, the factor analysis and the mathematical treatment of the experiment results were carried out.

The ascertaining experiment conducted at the beginning of the experimental work, which included such methods of pedagogical research as observation, questionnaire, interview, enabled to reveal the level of preparation of future teachers for the organization of project training, with the corresponding awareness of the need for professional-pedagogical self-improvement and the readiness of the future teacher using modern digital tools.

To assess the preparation of future teachers for the organization of project training, the following types of questionnaires were carried out: "Teacher's Professional Activities" questionnaire and the future teacher's readiness test to measure future teachers' proficiency for the organization of project training.

Analysis of the results of the questionnaire and additional refining interviews with the students have made it possible to reveal the proficiency of future teachers for the organization of project training based on digital tools.

The data received predetermined the need for targeted work to increase the level of preparation of future teachers for the organization of project training.

At the formative stage of this experimental work, the students studied the discipline "Technologies for project training in informatics and ICT." According to the conditions of the experiment, students, having studied the course, applying the acquired knowledge in the process of pedagogical practice. They organized the project activities of students, following the recommendations of the course. Before the implementation of the project method, the level of students' proficiency in the subject "Informatics and ICT" was lower than after the introduction of project technology using digital tools.

Students who applied the course recommendations in pedagogical practice noted that they had become more confident and effective in working with digital tools, learned to develop tasks, methodological guidelines for organizing the project activities of students, and developed the ability to increase the interest and motivation of the students. The control phase of the study included a re-questionnaire and testing of future informatics teachers aimed at measuring students' proficiency in the organization of project training using digital tools. The results of the questionnaires have shown an increase in the students' proficiency. The study data are presented as a diagram (see Fig.2).

As can be seen from the diagram, the level of preparation of future informatics teachers for the organization of project training after studying the discipline "Technologies for project training in informatics and ICT" and passing pedagogical practice has increased to an average of 11%, which indicates the sufficient effect of the technology given to form the professional competence of the future teacher in organizing the project activities of students using digital tools.

DYNAMICS OF READINESS OF STUDENTS
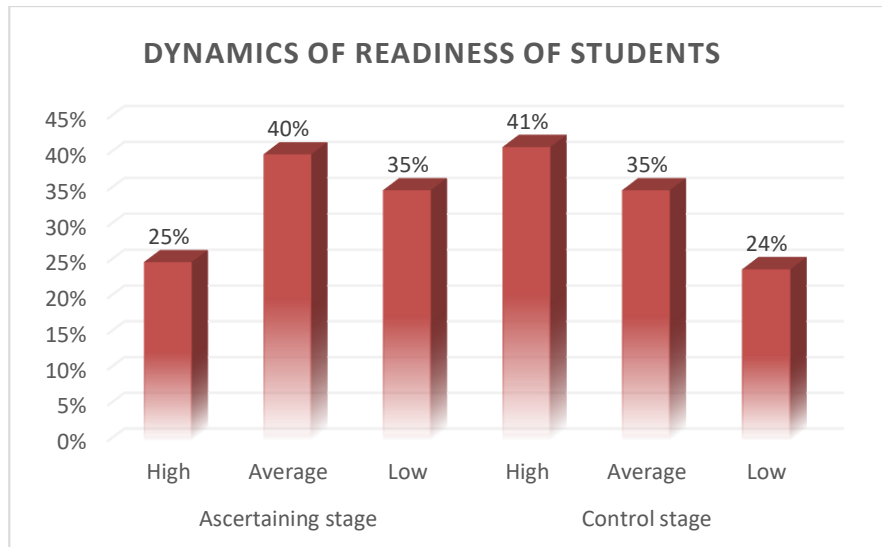
Fig. 2. Level of readiness of students to organize project training using digital tools.

5   Conclusions

Because of presently onrushing digital space, a modern teacher is supposed to be proficient in the use of innovative digital pedagogical tools. The use of digital tools enables to increase the effectiveness of the organization of project activities, develop the motivation of students, and implement differentiated and individual approaches.

For effective development of future teacher digital competence along with full-time classes, it is advisable to use distance educational technologies. The best way to develop the skills of using digital tools takes place during on-the-job teaching practice. This approach makes it possible to improve the quality of future computer science teachers' professional training, which will ensure their high competitiveness.

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