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Research Article

METHODOLOGY FOR USING INTERACTIVE AND MODERN DIGITAL EDUCATIONAL TECHNOLOGIES IN TEACHING THE SUBJECT "INFORMATION TECHNOLOGIES IN TECHNICAL SYSTEMS"

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ABSTRACT

This article highlights the methodology for the effective use of interactive and modern digital educational technologies in teaching the subject of information technology in technical systems. The importance of using Google Drive tools in the learning process is considered through interactive approaches, including the Pedagogy Wheel method. The article notes that digital technologies increase innovative opportunities in the formation of students' professional competencies, further strengthen knowledge, and revitalize practical activities. According to the research findings, the implementation of modern technologies serves to enhance the effectiveness of learning, as well as the need to apply advanced teaching methods in teaching technical disciplines.

KEYWORDS

Education, student, professional competence, method, Google Disk, Pedagogy Wheel, Bloom's Taxonomy, AUTOCAD.

INTRODUCTION

Currently, in the training of personnel in the mining industry in higher education institutions, one of the pressing issues is the provision of students with in-depth theoretical knowledge, skills, and practical abilities using interactive educational technologies and information and communication technologies, the formation of their professional knowledge, skills, and abilities, and the development of professional competencies.

As a result of the development of science, technology, and innovative technologies, interest and attention to improving the effectiveness of education through the use of interactive methods (innovative pedagogical

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and information technologies) in the educational process are increasing day by day [1.9].

Classes using modern technologies in the education system are aimed at teaching students to independently study and analyze acquired knowledge, self-assess their knowledge, develop professional competencies through the practical use of acquired skills and abilities, and draw correct conclusions.

The correct implementation of pedagogical technologies in the educational process leads to the teacher acting as the main organizer or consultant in this process.

Pedagogical technology is the content of the pedagogical activity process, organized on the basis of a specific project, aimed at a specific goal and guaranteeing the achievement of this goal [2.93].

The peculiarity of pedagogical technology is determined by the fact that it creates and implements a learning process that guarantees the achievement of the set goals.

MAIN PART

Currently, to solve the problems facing the education system, specialists are needed who are able to quickly assimilate new information and correctly assess their acquired knowledge, make timely decisions, and think independently and freely. Therefore, modern teaching methods, i.e., interactive methods, knowledge and experience in applying innovative technologies in the educational process of higher education institutions, ensure that students are knowledgeable, mature, and competent professionals with developed professional competencies.

The word "method" in Greek means research, a way, a method of achieving a goal. A method, in its most general sense, is a way of achieving a goal, an activity regulated in a certain way [3.47].

Educational methods are a set of methods for organizing the teacher's guiding activity in solving various didactic tasks aimed at mastering the material being studied, as well as the joint organization of students' reading and cognitive activity.

Innovation - means to innovate, update, change something. Innovative pedagogical technologies mean the introduction of innovations and changes into the education system, the pedagogical process, and the activities of the teacher and student, and interactive methods are primarily used in the implementation of this process [1, 10].

Interactive ("Inter" means interacting, "act" means acting) means interacting (or being in conversation, communication with someone). The essence of interactive learning is education aimed at students learning from each other and together [4,11].

Interactive learning, interactive methods, is a system of methods based on regular communication, a special form of organizing cognitive and communicative activity, that is, it is carried out through the joint activity of the teacher and students.

In the process of teaching the subject "Information Technologies in Technical Systems" for the mining industry, the use of interactive educational technologies and modern digital educational technologies in the formation of students' professional competencies plays an important role, implemented using creative technologies and innovative methods.

The organization of the lesson process using methods such as "Pedagogy Wheel," "Syndicate," and "Opposite Attitude" in teaching the subject "Information Technologies in Technical Systems," along with teamwork with students, also increases the ability to work with each student individually. The use of the "Pedagogical Wheel" method in teaching the subject "Information Technology in Technical

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Systems" to students in the field of mining is an effective method for enhancing students' knowledge and skills related to information technology and developing their professional competencies. The "Pedagogy Wheel" method was developed by Australian teacher and pedagogical innovator Alan Carrington in 2015. It provides teachers with modern technologies and applications as a tool for effective integration into the educational process. The main goal of this methodology is to organize a practical and creative learning process for students based on Bloom's taxonomy [5.91].

Below, the essence of the aforementioned methods in organizing classes in the subject "Information Technologies in Technical Systems" for higher education institutions, how to implement them, and how to apply them in the lesson process through the capabilities of Google Drive, can be described based on the following educational materials.

The "Pedagogical Wheel" method is a tool aimed at connecting technologies with pedagogical goals in the educational process, helping students develop critical thinking, creative approaches, and communication skills. This method connects the learning process of students to the stages of Bloom's Taxonomy and allows for the successful incorporation of technologies into the learning process [6].

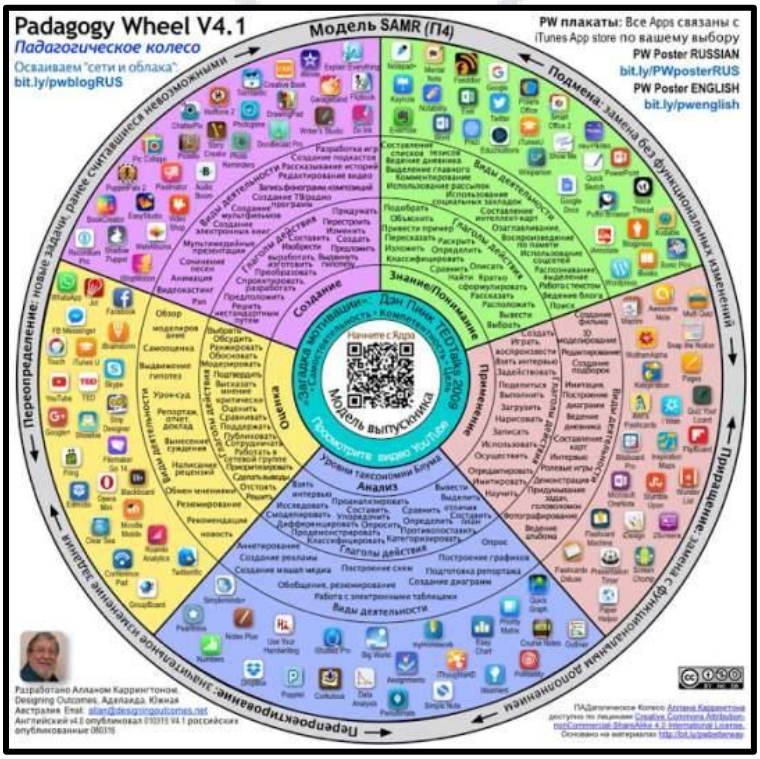

Figure 1. “Pedagogy Wheel”

The "Pedagogical Wheel" method allows for the use of various technologies to improve students' knowledge levels. The Wheel covers the levels of Bloom's Taxonomy - cognition, understanding, application,

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analysis, synthesis (creation), and evaluation [7]. Different technologies can be used at each level, such as text writing, drawing, programming, video production, etc.

Google Drive Usage Method:

The use of Google Drive tools is very convenient and effective when using the Pedagogy Wheel method for mining students in the subject "Information Technologies in Technical Systems." Below are methodological instructions on how to implement this method.

Tasks will be created that match the steps of Bloom's Taxonomy:

In the learning stage, students are provided with information about the basic concepts of the given topic using Google Docs or Google Slides. Students become familiar with the areas of application of the given topic. Students write brief comments on a given topic or prepare a presentation on each component on Google Slides.

Understanding - creates a table about a given topic in Google Sheets. Students need to understand how AUTOCAD works, for example, and how their field relates to this program. Students enter their concepts for each topic type in a table and evaluate each other through Google Sheets.

During the application stage, students will be sent practical assignments related to the given topic through Google Forms. Students learn to control technical systems in practice by applying their theoretical knowledge. Each student is given small assignments to work on a given topic (for example, explaining the process of creating a database or installing technical software).

During the analysis stage, students are asked to write a report using Google Docs to analyze the advantages and disadvantages of the given topic. Students evaluate their effectiveness by analyzing the positive and negative aspects of programs on various topics. Students analyze the technological aspects of the programs on the topic and write critical opinions based on them.

During the synthesis (creation) stage, through Google Sites, students are instructed to create a small website to describe the workflow of programs on the topic. Students will learn to demonstrate their own technological solutions and present their work in an innovative way. Students create a website about the topic and enter all their learned practical work into it.

At the evaluation stage, a test or questionnaire is prepared through Google Forms, where students need to know how they were evaluated on the topic. Students learn to independently comment on how programs on the topic work and are effective. Students answer test questions or comment on the work of their friends.

Teaching technology using the Pedagogy Wheel method:

When implementing the Pedagogy Wheel through Google Drive, it is recommended to use the following technologies:

- Google Docs - Create learning materials, practice assignments, and reports.

- Google Slides - Visual presentation of presentations and educational content.

- Google Forms - Tests, surveys, and ratings.

- Google Sheets - Analyze and compare data.

- Google Sites - for students to create their own websites or project presentations during the creation phase.

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The organization of the learning process through Google Drive can be carried out as follows:

- Creation of a database: All educational materials are collected in one place through Google Drive, and students are given access.

- Activity monitoring: Students' assignments are monitored and evaluated through Google Forms or Google Docs.

- Working in groups: Students will be able to work in groups on Google Docs or Slides. This allows for mutual cooperation and exchange of experience.

By applying the "Pedagogical Wheel" method in the subject "Information Technologies in Technical Systems" for students in the field of mining, students are reinforcing their theoretical knowledge with practice, using technological tools at each stage of learning. The capabilities of Google Drive make this method very convenient, especially in distance learning or group work.

RESULTS

Let's consider the technology of conducting practical classes using the "Pedagogy Wheel" method for students specializing in mining in the subject "Information Technologies in Technical Systems" on the topic "Using the graphic capabilities of the AUTOCAD program in the design process":

The "Pedagogical Wheel" is a method aimed at effectively organizing the learning process and teaching students on a large scale using various teaching methods [8].

This model correctly plans the learning process using Bloom's taxonomy and modern technological tools (for example, AUTOCAD). The main goal of the "Pedagogy Wheel" is to comprehensively develop students' knowledge, skills, and competencies.

Below are methodological instructions on how to apply the "Pedagogy Wheel" method in practical classes for students specializing in mining on the topic "Using the graphic capabilities of the AUTOCAD program in the design process."

Lesson topic. "Using the graphical capabilities of the AUTOCAD program in the design process" [9].

The purpose of the lesson is to teach students in mining specialties the graphic possibilities of the AUTOCAD program and develop the ability to apply them in solving problems. During the lesson, students will have the opportunity to create and analyze various projects in the AUTOCAD program.

Competencies:

Communicative competence - Being able to logically formulate questions based on the topic and answer them.

Competence in working with information - Access all information sources.

Self-development competence. Constant self-development, a sense of responsibility in working in groups, and a demonstration of leadership skills.

The Pedagogy Wheel model implies the development of students' skills at different levels during the learning process. This method is based on Bloom's taxonomy of skills and aims to develop students' professional competencies in the following stages [10].

The knowledge level provides students with an overview of the main capabilities and graphic tools of the AUTOCAD program. At this stage, students are shown the AUTOCAD interface, toolbar, and the main functions necessary for working in the program.

Google Slides - The teacher prepares a presentation to explain the AUTOCAD interface and tools. Visual

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materials are provided about the purpose and use of each tool.

Theoretical information about the graphic capabilities of Google Docs - AUTOCAD and their application in mining projects is collected.

Understanding Stage - Students gain an understanding of how to use tools in the AUTOCAD program. At this stage, they are explained what projects can be created in the program, how graphic elements are placed, and their important features.

Google Meet - interacts with students, and the use of tools in the program is shown live.

Google Docs - Students write down the necessary information about the main features of drawings in AUTOCAD.

The application stage involves students completing practical exercises using the AUTOCAD program. Students create technical drawings related to mining using graphic tools from AUTOCAD. They will practice how to use the possibilities of graphics when creating drawings in the program.

Google Drive - The teacher places sample files prepared for working with AUTOCAD on Google Drive, students download these files and complete practical exercises.

Google Docs - Students prepare practical work performed using AUTOCAD in the form of reports.

The analysis stage involves students analyzing the created drawings. At this stage, students review their work, evaluate its effectiveness, and analyze which graphic possibilities were used correctly.

Google Sheets - Students create a table to compare and evaluate projects created in AUTOCAD, where various graphic tools are used and their effectiveness is studied.

Google Forms - The teacher prepares a questionnaire about which of the AUTOCAD graphic tools are used effectively, and the students evaluate their work.

The stage of synthesis (creation) - Students can develop a new project based on drawings created in the AUTOCAD program. At this stage, they are required to improve their projects and further develop drawings using additional graphic elements.

Google Sites - Students present their projects created in AUTOCAD using Google Sites. Each project is filled with graphic elements and explains what graphic possibilities were used.

The evaluation stage - At the end of the lesson, the students' projects are evaluated. The teacher assesses the correct application of graphic possibilities, the technical quality of the projects, and the possibility of their practical application.

Google Forms - Creates teacher evaluation criteria for student-generated drawings and projects. Through these criteria, students can evaluate themselves and express their opinions about the work of other groups.

Google Meet - In an online session, students evaluate and discuss each other's work.

CONCLUSION

Advantages of the Pedagogy Wheel method:

- A comprehensive approach: through the Pedagogy Wheel method, all stages of the training are focused on the comprehensive development of students' knowledge and skills.

- Participation of students: At each stage, students actively participate, reinforce theoretical knowledge in practice, and acquire it.

- Innovative approach: the use of Google Drive and other technological tools helps to modernize the

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learning process, students develop online communication and collaboration skills.

The use of the "Pedagogy Wheel" method in practical classes on the use of graphic possibilities in the AUTOCAD program contributes to the systematic and gradual development of students' skills. The successful implementation of this method through technological platforms such as Google Drive makes the learning process for students interactive and effective.

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