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USING MODERN VISUALIZATION TOOLS WHEN TEACHING SPECIAL DISCIPLINES

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Abstract: The article discusses such modern technologies for visualizing educational information as scribing, mind maps, timeline, crossents, word cloud. Recommendations are given for their use in classes in special disciplines.
Key words: Special discipline, modern technologies, visualization, education, innovative visualization methods.

Introduction: Training in special disciplines for technical areas often involves the assimilation of complex information that requires analysis, perception and understanding of various concepts [1]. In recent decades, information visualization has become a key tool in the learning process, allowing students to more effectively assimilate the material and overcome the difficulties associated with understanding abstract concepts.

Visualization plays an important role in presenting abstract information in a learning context. It helps students to master complex concepts by creating visual models, diagrams, diagrams, graphs and other visual means. This contributes to a better understanding and assimilation of the material, since visual images are easier to remember and help to link new information with existing knowledge [4].

Modern educational practices include a variety of innovative visualization methods. This includes the use of virtual reality, interactive whiteboards, animation, online courses with multimedia materials and other technological means that contribute to the effective transmission of information.

Research shows that visualization significantly increases the effectiveness of learning. Students using visual methods in the educational process have a higher level of material assimilation, better memorize information and demonstrate a deeper understanding of key concepts [9, 10].

Literature analysis: Research in the field of visualization of educational information was conducted by many scientists. Among the innovative teaching methods used today are technologies such as scribing, intelligence maps, timeline, crossents, word cloud and others.

Kutepova L.I., Smirnova Zh.V., Komleva V.Sh., Stryapikhina A.A. argue about the expediency of using visualization technology – scribing, which has a positive impact on the development of personal qualities of students in the educational process. The technique of scribing at the lecture allows you to provide a lively presentation, to present persistent and memorable theses. The most effective use of scribing in group activities of students. In the process of using scribing, students develop imagination and creativity. The authors list the main advantages of using scribing: memorization efficiency, synchronicity of audio and video sequences, minimal costs. The introduction of scribing in the learning process increases educational motivation, develops creative thinking. With the use of scribing, the effectiveness of learning increases, the independence of students increases [6].

Vaganova O.I., Ponomarenko E.B., Zubkova Ya.V. noted that one of the directions of development of the education system is the use of innovative teaching methods corresponding to

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the level of cognitive and creative activity of modern students. One of the ways to organize the educational process is the use of intelligence cards. The intelligence map is a visual representation of the educational material, which reflects the main elements of the studied issue and the relationship between them. The authors describe the structure of the intelligence card using the example of the MindMeister electronic service. A survey of students on the results of educational activities after using intelligence cards was conducted. The forms of training on which intelligence cards can be effectively used are analyzed. Through the use of logical hierarchies, students systematize the material and focus on important information. The associations that students build in the process of building intelligence maps allow them to firmly consolidate the educational material, take a fresh look at the problem posed, and see a non-standard solution [2].

Guzanov B.N., Fedulova K.A. consider the issues of increasing the effectiveness of studying complex technical disciplines by improving educational technologies through the use of innovative digital tools and resources based on the visualization of educational elements. The authors have studied the essence of visualization of educational information, which is aimed not only at demonstrating engineering processes and systems, but also at activating the cognitive activity of students and stimulating motivation to study special disciplines of future professional activity. The authors substantiate the need to use digital visualization technologies to ensure the effectiveness of studying complex engineering disciplines [3].

Kolmakova L.A. a generalized characteristic of the technology of visualization of educational information is given. The application of cognitive visualization models involving information and communication technologies is substantiated. The results demonstrating the change in the indicators of motivational activity of students before and after the application of "logical-semantic models" (LSM) and "metaplan" in the educational process are presented. The features of the directed application of methods of cognitive visualization of educational information are reflected both for the improvement of educational and cognitive activity and for the formation of professional competencies [5].

Domestic researchers are also working to study the possibilities of visualization in the educational process [7, 11]. Alimov U.B. studied the methodology of teaching students computer visualization based on the cluster approach. Erkaev H.A. researched issues on the development of training simulators and visualization methods for practical training in the discipline of Information Security.

Kholmurodov A.E. and Ergashev N.G. studied the problems of improving the efficiency of the educational process through the use of didactic visual aids that enhance the intellectual and cognitive activity of higher school students. The presentation of educational material based on visual technologies allows you to implement educational content in multimedia and interactive form. In addition, it is justified that teachers should possess methods and means of presenting educational material and applying them in practice [8].

Research methodology: The analysis of the scientific literature on the subject of the study allowed us to put forward the hypothesis that teaching students of pedagogical universities special disciplines based on visual teaching methods will increase educational motivation, will contribute as a future teacher to develop creative thinking, have a positive impact on the effectiveness of training and increase the independence of students.

Analysis of regulatory documentation, namely qualification requirements, curricula, standard and training programs allowed us to establish that for students of the Mathematics-Computer Science direction, special disciplines in computer science are such as Algorithmization and programming languages, Computer Graphics and visualization, Computer Science and digital technologies, and others. One of the disciplines that cause some difficulties for students to master is the subject of Algorithmization and programming languages. Therefore,

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it was proposed for research to explore the possibilities of using modern visualization methods in teaching programming languages.

Observations of students' learning in lectures, laboratory and practical classes using such methods as scribing, intelligence maps, timeline, crossents, word cloud allowed us to give the following recommendations for optimizing visualization in the education of special disciplines.

It is necessary to actively integrate modern information visualization technologies: teachers should use modern technologies to create visual materials, making the learning process more interactive and exciting for students.

Variety of methods: A variety of visual methods, such as graphs, diagrams, simulations, animations, allow you to better adapt to different learning styles of students.

Performance Evaluation: It is important to evaluate the effectiveness of visualization in education by conducting research and surveys among students to continuously improve teaching methods.

Conclusion: Visualization plays a key role in teaching special disciplines, contributing to a more effective assimilation of information by students. Innovative visualization methods and technologies provide ample opportunities for improving education and professional training in the fields of science, technology, engineering and mathematics. Taking into account the individual characteristics of students, as well as paying attention to the variety of visual methods, it is possible to create more effective strategies for teaching special disciplines.

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