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The Role and Potential Applications of Interactive Tools and Pedagogical Technologies in The Educational Process

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Abstract: The article is dedicated to the role, significance, and possibilities of applying interactive tools and pedagogical technologies in the modern educational process. It scientifically analyzes the impact of interactive tools on the quality of education, their role in the activities of teachers and students, as well as existing problems in their use and ways to eliminate them. The article presents a classification of various interactive tools and pedagogical technologies used in the educational process, revealing their advantages and disadvantages.

Keywords: Interactive, classification, integration, individual, competence, visual.

Introduction: The modern educational process is closely related to information and communication technologies (ICT), which are rapidly developing on a global scale. Today, interactive tools and pedagogical technologies occupy an important place in the activities of teachers and students. These tools allow for improving the quality of education, ensuring student engagement, teaching them independent thinking, developing their creative abilities, and individualizing learning. Therefore, the study of the role of interactive tools and pedagogical technologies in the educational process and the possibilities of their use is relevant.

The education system is an important component of any society, and its development directly affects the economic, social, and cultural development of the country. At the beginning of the 21st century, fundamental changes are taking place in the field of education. Along with traditional teaching methods, new pedagogical technologies and interactive tools are widely used. These changes, on the one hand, make the educational process more effective, and on the other hand, require new skills from the teacher and the student.

The concept of interactivity refers to interaction in education. Interactive tools provide communication between the teacher and the student, as well as between students. This, in turn, increases students' interest in the lesson, ensures their activity, and improves their level of assimilation. Pedagogical technologies include a set of methods, tools, and forms used in organizing, planning, and managing the educational process.

Large-scale reforms in the field of education are also being implemented in Uzbekistan. In particular, in accordance with the Decree of the President of the Republic of Uzbekistan dated November 6, 2020 No. UP-6108 "On Measures for the Development of Education, Upbringing and Science in the New Period of Uzbekistan's Development," in recent years, systematic work has been carried out in the country to improve the quality and effectiveness of the education system, the formation of modern knowledge and skills among kindergarten pupils, schoolchildren and students, close cooperation and integration between educational systems and the field of science, ensuring the continuity and consistency of education.

The role of interactive tools and pedagogical technologies in achieving these goals is invaluable. At the same time, it is necessary to dwell on the role of ICT in education. Currently, ICT is widely used at all levels of education. Electronic textbooks, multimedia presentations, online courses, virtual laboratories, and many other ICT-based tools make the educational process more convenient, interesting, and effective.

Literature review: Many studies have been conducted on this topic. In particular, a number of works have been carried out in this area in Uzbekistan. Studies show that interactive tools make the educational

process more interesting and effective. However, there are some issues with their use.

For example, in Uzbekistan, the research of D. Taylakova is devoted to the advantages of interactive teaching methods and ways to use them. His works demonstrate the role of interactive methods in increasing student activity and their importance in teaching independent thinking. Also, R.Umarova in her research considered the issues of increasing the ICT competence of teachers, preparing them for the use of modern technologies. In particular, his textbook "Information Technologies in Pedagogical Education" covers the methods of forming knowledge and skills of future teachers in the field of ICT.

The role of interactive tools in education is also widely covered in the works of foreign researchers. In particular, the famous American philosopher and educator John Dewey emphasized the importance of activity and interactivity in education in his works. In his opinion, the educational process should be based on the active participation of the student. Also, the Canadian scientist Marshall McLuhan, in his work "Media is News," studied the influence of technology on education and revealed the role of electronic means in education. In addition, one of the modern researchers, Michel Resnik, in his book "Learning Life," demonstrated the role of interactive technologies in the development of students' creative abilities. However, despite this, some problems remain with the use of interactive tools. There are problems such as insufficient teacher training, the lack of modern technologies in all educational institutions, and insufficient development of methods for using interactive tools. This study shows ways to eliminate these problems.

Purpose and questions of the study: The purpose of the study is to determine the role of interactive tools and pedagogical technologies in the educational process and to reveal the possibilities of their use.

Research questions:

1. How do interactive tools influence the educational process?
2. What interactive tools and pedagogical technologies exist, and what are their advantages and disadvantages?
3. What methodological recommendations can be given for the effective use of interactive tools in the educational process?

METHODOLOGY

Mixed methods were used in the research. This method allows for the collection and analysis of various data, ensuring the reliability and completeness of the research results. The design of mixed-method research is based on the combined use of qualitative and quantitative data. In this study, the design of the sequential mixed method was used, where first a qualitative study (interview, observation) was conducted, and then a quantitative study (survey) was conducted.

The study was conducted in two stages:

1. Theoretical stage: At this stage, scientific literature on the topic was analyzed. Articles, books, dissertations, and internet resources were studied. The purpose and questions of the research were clarified. The following literature was analyzed at this stage:

- decrees and resolutions of the President of the Republic of Uzbekistan;
- Regulatory legal acts of the Ministry of Higher Education, Science and Innovation;
- Scientific articles and research of Uzbek and foreign scientists;
- Materials of international organizations in the field of education (UNESCO, UNICEF).

2. Empirical stage: The following methods were used at this stage:

- Questionnaire: A survey was conducted to determine the experience of teachers and students in using interactive tools and pedagogical technologies, their opinions on their advantages and disadvantages. The questionnaire questions were aimed at answering the research questions and included open and closed types of questions. To ensure the reliability and validity of the questionnaire, the Krombach alpha was used. The survey was created on the Google Forms platform and distributed online.
- Observation: During the lesson, the effectiveness of teacher-student interaction and the use of interactive tools was observed. The observations were conducted with the participation of students of the "Art History" educational direction of the Urgench State Pedagogical Institute.
- Interview: Interviews were conducted with teachers. During the interviews, their difficulties, successes, and suggestions regarding the use of interactive tools were studied. The interview questions were semi-structured and aimed at answering research questions. The interviews were conducted online via the Zoom platform and recorded in audio format.

The research was conducted with the participation of students of the "Art History" program of the Urgench State Pedagogical Institute. The average length of service for teachers was 10 years. The students were undergraduate students studying in different courses.

Participants were selected randomly. The following demographic data were collected about the study participants:

- Teachers: gender, age, work experience, academic degree, faculty;
- Students: gender, age, course, faculty.

The following interactive tools and pedagogical technologies were used in the study:

- Smart Board
- Computer and Projector (Epson)
- Educational programs (Moodle, Canvas)
- Online Testing Systems (TestMaker)
- Video conferencing platforms (Zoom, Google Meet)

The study was conducted in the following stages:

1. Studying the literature on the topic and identifying research questions.
2. Formulating questionnaire questions, ensuring their reliability and validity.
3. Conducting a survey among teachers and students.
4. Observing the lesson process and drawing up an observation report.
5. Conducting interviews with teachers and formulating interview questions.
6. Analyze the collected data and draw conclusions.

The survey results were statistically analyzed using the SPSS 23.0 program. Average values, standard deviations, and frequencies were calculated. Using the Shapiro-Wilk test, the normal distribution of data was checked. Differences between groups were determined using the t-test and ANOVA for independent groups.

Observation and interview data were analyzed using the qualitative analysis method. The data were divided into categories and summarized using thematic coding. For data reliability, the triangulation method was used.

RESULTS

The research results showed that interactive tools and pedagogical technologies occupy an important place in the educational process. 85% of teachers and 92% of students believe that the use of interactive tools makes lessons more interesting and effective. This result shows high interest in interactive learning, especially among students, which, in turn, contributes to increasing their engagement in the lesson and the level of assimilation.

Teacher survey results

According to the results of the teacher survey, the most frequently used interactive tools in the lesson are:

- Interactive whiteboard (78%)
- Computer and projector (90%)
- Educational programs (65%)
- Online testing systems (72%)
- Video conferencing platforms (80%)

According to teachers, interactive tools have a positive impact on the following aspects of the lesson:

- Student activity (88%)
- Student interest in the lesson (92%)
- Understanding of educational material (85%)
- Students' assimilation rate (80%)

The questionnaire also revealed difficulties for teachers in using interactive tools. 60% of them noted that they do not have sufficient knowledge to work with interactive tools. 40% of teachers indicated a lack of modern technologies in the educational institution. To solve these problems, it is necessary to regularly train teachers and provide educational institutions with the necessary technologies.

Student survey results

According to the results of the student survey, they assessed the lessons conducted using interactive tools as follows:

- Interesting (95%)
- Understood (90%)
- Memorable (88%)
- Useful (92%)

Students also believe that interactive tools contribute to strengthening collaboration in class (85%) and independent learning (80%). These results and interactive tools not only make the learning process interesting but also improve student interaction and encourage self-learning.

Observation results

The results of observing the lesson process showed that student activity is high in lessons using interactive tools. Teachers used various interactive methods to organize the lesson, including:

- Problem-based learning (70%)
- Project Method (60%)
- Group work (80%)
- Brainstorming (75%)
- Discussion lessons (65%)

Observations have shown that interactive tools

strengthen communication between teachers and students, allowing them to freely express their thoughts. This, in turn, contributes to the development of students' critical thinking skills.

Interview results

Interviews with teachers showed that they are satisfied with the use of interactive tools. In their opinion, interactive tools make the lesson more lively and interesting, increasing students' interest in the lesson. However, teachers face some difficulties in using interactive tools. The most common of these are:

- Technical malfunctions (50%)
- Low Internet speed (40%)
- Power outages (30%)
- Lack of knowledge to work with interactive tools (60%)

Teachers also expressed their need for methodological recommendations on the use of interactive tools. This demonstrates the importance of supporting teachers and providing them with the necessary resources.

Results Analysis

The research results showed that interactive tools and pedagogical technologies occupy an important place in the educational process. 85% of teachers and 92% of students believe that the use of interactive tools makes lessons more interesting and effective. This result demonstrates a generally positive attitude towards interactive learning between teachers and students. In particular, high student performance indicates their engagement in the lesson and readiness for academic performance. This, in turn, contributes to improving the effectiveness of education.

Teachers' point of view: The results of the teacher survey showed that they most often use interactive whiteboards (78%), computers and projectors (90%), educational programs (65%), online testing systems (72%) and video conferencing platforms (80%). This indicates teachers' readiness to use various interactive tools and their integration into the educational process. According to teachers, interactive tools increase student activity (88%), interest in the lesson (92%), understanding of the material (85%), and the level of assimilation (80%). These results confirm the positive impact of interactive tools on the quality of education. However, 60% of teachers lacked sufficient knowledge to work with interactive tools, and 40% of educational institutions lacked modern technologies. To address these issues, the following measures must be taken:

- Organization of regular training for teachers on the use of interactive tools;
- Provision of educational institutions with modern technologies;
- Creation of an incentive system for increasing the technological competence of teachers.

Students' point of view: Student survey results showed that they evaluate lessons conducted using interactive tools as interesting (95%), understandable (90%), memorable (88%), and useful (92%). In addition, students believe that interactive tools enhance collaboration (85%) and independent learning (80%). These results show that interactive tools not only make the learning process interesting but also improve student interaction, encourage self-learning, and teach independent thinking.

Observation results: The results of observing the lesson process showed that student activity is high in lessons using interactive tools. Teachers used various interactive methods, such as problem-based learning (70%), the project method (60%), group work (80%), brainstorming (75%), and discussion lessons (65%). These methods ensure students' engagement in the lesson and increase their level of mastery. Observations have shown that interactive tools strengthen communication between teachers and students, and students can freely express their opinions. This will help develop students' critical thinking skills.

Interview results: Interviews with teachers showed that they are satisfied with the use of interactive tools. In their opinion, interactive tools make the lesson more lively and interesting, increasing students' interest in the lesson. However, teachers face difficulties such as technical malfunctions (50%), low internet speed (40%), power outages (30%), and insufficient knowledge to work with interactive tools (60%). In addition, teachers expressed their need for methodological recommendations on the use of interactive tools. These results demonstrate the importance of supporting teachers and providing them with the necessary resources.

Category	Key results	Percentage indicators	Recommendations/Difficulties
Teacher's perspective	Interactive tools make lessons effective and interesting. Tools used: interactive whiteboard (78%), computer/project (90%),	85% confirm effectiveness, 60% lack knowledge, 40% lack	Organization of training, provision of modern technologies, creation of an incentive system.

Category	Key results	Percentage indicators	Recommendations/Difficulties
	educational programs (65%), online tests (72%), video conferencing (80%). Activity (88%), interest (92%), understanding (85%), assimilation (80%) increase.	technology.	
Student point of view	Lessons are interesting (95%), understandable (90%), memorable (88%), useful (92%). Mutual cooperation (85%) and independent learning (80%) are strengthened.	92% consider it effective.	Development of independent thinking and cooperation.
Observation results	Interactive tools increase student activity. Methods: problem-based learning (70%), projects (60%), group work (80%), brainstorming (75%), discussions (65%). Communication and critical thinking develop.	Activity and academic performance are high.	Expansion of interactive methods.
Interview results	Teachers are satisfied with the tools, and the lessons are lively. Difficulties: technical malfunctions (50%), poor internet (40%), power outages (30%), lack of knowledge (60%).	60% need methodological assistance.	Solving technical problems, providing methodological support.

DISCUSSION

The research results showed that interactive tools have a positive impact on the educational process. 80% of teachers and 90% of students believe that interactive tools make the lesson more interesting and understandable. The observation results showed that student activity is high in classes using interactive tools. This result corresponds to the main goal of interactive learning, which strengthens the interaction between the teacher and the student.

In the survey, interactive whiteboards, computers and projectors, educational programs, and online testing systems were noted as the most frequently used interactive tools by teachers and students. According to the teachers, the interactive whiteboard helps to visualize the lesson, and the computer and projector allow the use of various presentation materials. While educational programs help students acquire independent knowledge, online testing systems facilitate the assessment of their knowledge. All these tools serve to increase students' cognitive activity and strengthen their knowledge.

The study also revealed some problems in the use of interactive tools. 60% of teachers noted that they do not have sufficient knowledge to work with interactive tools. 40% of teachers indicated a lack of modern technologies in the educational institution. These problems indicate the need to train teachers and provide educational institutions with the necessary technologies.

The obtained results are consistent with previous studies. In particular, John Dewey emphasized the importance of activity and interactivity in education. In his opinion, active student participation increases the effectiveness of education. Marshall McLuhan studied the impact of technology on education and revealed the role of electronic tools in education. The results of these studies support the ideas of McLuhan and Dewey and confirm the growing role of technology in modern education.

The problems identified in the study are also noteworthy. The need to improve teachers' technological competence is also reflected in the research of R. Umarova. Umarova in her work developed methods for the formation of knowledge and skills of future teachers in the field of ICT. The

results of this study once again confirm the importance of preparing teachers to use modern technologies and demonstrate the need to ensure continuous professional development of teachers.

The practical significance of the research lies in the fact that its results will contribute to the development of methodological recommendations aimed at expanding and improving the use of interactive tools in the educational process. In addition, the research results can be used to improve teacher training programs. Methodological recommendations developed based on the research results will help teachers effectively use interactive tools in the lesson process, increase student activity, and improve the quality of education.

The limitations of the study are the limited number of study participants and the short duration of the study. In the future, it is advisable to conduct more extensive research on this topic, in particular, to study the specifics of using interactive tools at different levels of education (school, college, university). It will also be useful to conduct research comparing the influence of various interactive tools on the effectiveness of education. In addition, in the future, attention should be paid to the development of methods for using interactive tools, taking into account various individual characteristics of students (for example, learning styles, abilities).

CONCLUSION

The research results showed that interactive tools and pedagogical technologies occupy an important place in the educational process. Most teachers and students believe that the use of interactive tools makes lessons more interesting, understandable, and effective. This, in turn, contributes to improving the quality of education and the level of student achievement. As determined in the study, interactive tools not only improve the interaction between teachers and students, but also increase student activity, increase their interest in the lesson, and facilitate the understanding of educational material.

At the same time, the study also revealed difficulties for teachers in using interactive tools. Many of them noted that they do not have sufficient knowledge to work with interactive tools, and there is a lack of modern technologies in educational institutions. In addition, some teachers face technical problems, such as low internet speeds and power outages. These difficulties prevent teachers from fully utilizing interactive tools and reduce the effectiveness of the educational process.

To solve the above problems and fully utilize the advantages of interactive learning, it is necessary to implement the following measures:

- Organize regular training for teachers on the use of interactive tools;
- Providing educational institutions with modern technologies, including computers, projectors, interactive whiteboards, and other necessary equipment;
- Increasing Internet speed and improving power supply;
- Creation of an incentive system for improving the technological competence of teachers;
- Development and distribution of methodological recommendations, manuals, and other resources on the use of interactive tools.

In general, the research results show that interactive tools and pedagogical technologies enrich the educational process, improve the interaction between teachers and students, and increase the level of student learning. Therefore, it is necessary to encourage their wider and more effective use in the educational process. This, in turn, contributes to improving the quality of education, increasing students' interest in learning, and preparing them for future success. The research results show that interactive educational technologies not only make the learning process interesting and effective, but also contribute to the development of such important skills of students as independent thinking, problem-solving, and critical assessment of information.

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