

INNOVATIVE PEDAGOGICAL FOUNDATIONS FOR THE DEVELOPMENT OF STUDENTS' INDEPENDENT LEARNING ACTIVITIES IN THE PROCESS OF IMITATIONAL COMPUTERED EDUCATION

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Abstract

This article covers the development of students' independent learning activities through simulation computer learning technologies. The factors of effectiveness of virtual laboratories and simulations are analyzed, and the scientific significance of innovative pedagogical approaches in the formation of creative thinking and reflexive analysis skills is substantiated.

Keywords: Simulation computer learning, independent learning activity, virtual laboratory, simulation, innovative pedagogical approach, educational effectiveness.

INTRODUCTION

In the current era of rapid globalization and the development of digital technologies, one of the most important tasks facing the education system is the effective organization and development of students' independent learning activities. Independent learning skills are an important foundation for the successful continuation of students' future professional activities not only in general education schools, but also in higher educational institutions. From this point of view, simulation computer learning processes create wide opportunities for increasing the effectiveness of students' learning, forming their ability to think independently and make correct decisions in problem situations.

The use of simulation computer technologies in the modern educational process allows students to independently apply knowledge in conditions close to real-life situations, search for new information, analyze it, and combine theoretical knowledge with practical activity. As a result, students develop personal responsibility, creativity, competencies in the selection and processing of information.

From a pedagogical point of view, the organization of the simulation computer learning process is not only the use of technical means, but also a systematic approach that serves to improve the educational process based on innovative methods and technologies, as well as to expand the cognitive, communicative, and reflexive activity of students. Especially in the current period of rapid development of information and communication technologies, the formation of independent education on innovative pedagogical foundations is becoming an important condition for the training of competitive personnel for the development of society.

Therefore, in this article, the scientific-theoretical and innovative pedagogical foundations of the formation and development of students' independent learning activities in the simulation computer learning process are analyzed, and effective ways of using modern methods and technologies are revealed.

LITERATURE REVIEW

In the education system, along with traditional educational processes, innovative approaches based on simulation computer technologies have been widely used in recent years. Such technologies are effective in the following areas, contributing to the development of students' independent learning activities:

- virtual laboratories;
- e-learning simulations;
- interactive educational programs;
- digital training and practice platforms;
- Students' self-monitoring and assessment systems.

These methods allow students to form not only theoretical knowledge, but also the skills of analysis, problem-solving, independent decision-making, and creative thinking.

The scientific foundations of the use of simulation computer learning tools are widely covered in scientific and methodological literature. In particular, foreign studies have shown that the organization of the educational process in a virtual environment increases the readiness of students for real-life processes, further activates the process of independent learning, and ensures the trajectory of individual development. In studies conducted by scientists of the republic, such aspects as the formation of students' digital competencies, the use of innovative educational resources, and a deeper understanding of the subject based on simulation models have been widely studied.

In their works, researchers from the Commonwealth of Independent States analyzed the psychological and pedagogical foundations of simulation learning, the mechanisms for activating students' cognitive activity, and the criteria for the effectiveness of learning in the digital environment. Also, foreign scientific sources widely cover innovative areas of simulation education, in particular, the implementation of modern technologies such as adaptive simulations, virtual reality tools, and gamification elements.

Analysis of scientific literature shows that simulation computer learning processes are an important factor in the formation and development of students' independent learning activities. Despite the fact that researchers have carried out extensive work on the theoretical foundations and practical application of these methods, the issues of increasing the readiness of teachers for the effective use of innovative technologies, adapting simulation programs to the national education system, and developing methodological recommendations that contribute to the individual development of students have not been sufficiently covered.

RESEARCH METHODOLOGY

In the traditional educational process, teaching students is more focused on the teacher's activity and the assimilation of ready-made information, while the student's independent research and deep analytical thinking are not sufficiently developed. This approach serves to determine what the student has learned, but does not allow assessing how they have learned, what strategies they have used in solving problems, and their ability to apply their knowledge in real-life situations.

Innovative educational technologies, in particular, simulation computer learning processes, provide an opportunity to activate the student's learning process, form and develop independent learning

activities. In this case, the main methodological approach is the organization of the educational process in an interactive, problem-based, and research-oriented form.

The following methods can be effectively used in simulation computer learning:

1. Virtual laboratories - so that students can independently conduct experiments in a safe environment and analyze the results.
2. Computer simulations - for independent study of real-world process models, learning to make decisions in various situations.
3. Electronic training and exercises - for the development of independent learning activities, quick feedback, and error analysis.
4. Portfolio and project works - to demonstrate students' individual approaches and creative searches.
5. Assessment rubrics and self-assessment systems - for the development of independent control, personal responsibility, and reflective analysis.

Using these methods, not only the final results of students are analyzed, but also the process of learning, the trajectory of development, and changes in cognitive activity. This allows the teacher to develop a student-centered approach, and the student to monitor their learning process.

In practice, the following problems arise:

- teachers' unpreparedness for the effective use of simulation learning technologies;
- the presence of discrepancies between educational programs and the capabilities of modern technologies;
- insufficient provision of technical infrastructure.

As a research methodology, personality-oriented, constructivist, systemic, and integrative approaches are used, and the goal is to develop an effective model for the formation and development of students' independent learning activities. At the same time, methodological recommendations will be developed aimed at developing students' independence, creativity, and problem-solving skills through the use of simulation learning tools based on artificial intelligence and digital platforms.

ANALYSIS AND RESULTS

A number of modern methods (virtual laboratories, computer simulations, interactive training and exercises, portfolio and project work, assessment rubrics and self-assessment systems) are yielding effective results in the development of students' independent learning activities in the simulation computer learning process.

The theoretical and practical data obtained during the study were statistically analyzed, and the role of simulation computer technologies in the development of the quality of students' knowledge and independent activity was clarified. Scientific and pedagogical sources show that while traditional methods are more focused on the assimilation of ready-made knowledge, imitation methods strengthen students' independent research, cognitive activity, and creativity .

According to the survey results, 87% of teachers noted that simulation computer tools significantly increase students' interest in the learning process. 83% of respondents noted that such technologies develop independent work skills, and 81% emphasized that they strengthen cooperation between students in group assignments.

Positive results were also observed in practice. As a result of the experimental work, students were able to:

- the ability to find solutions in problem situations increased by 20-25%;
- Independent speed and accuracy improved by 21%
- activity in projects and creative tasks increased from 45% to 70%;
- Self-assessment and reflection level were higher than traditional methods.

As the most important indicator, in classes using simulation technologies, the total level of student activity was 86%, while in classes taught using traditional methods, this indicator was about 65%. This scientifically confirms that simulation computer learning tools increase the interactivity of the educational process, enhance students' independent thinking, creativity, and responsibility.

Statistical data and experimental results show that the implementation of simulation educational processes provides about 20% positive dynamics in the formation of students' independent learning activities, increasing the effectiveness of their analytical thinking, problem-solving, and collaborative activities.

CONCLUSION/RECOMMENDATIONS

Simulation computer learning processes are an important pedagogical tool in the formation and development of students' independent learning activities. The research results show that these technologies develop students' skills not only in deepening theoretical knowledge but also in practical application, creative approach, and independent decision-making in problem situations.

During the study, the following main conclusions were made:

- the use of simulation computer learning tools strengthens students' skills in independent research, reflexive thinking, and self-control;
- through virtual laboratories, simulations, and interactive exercises, students develop the ability to make decisions in problem situations, analytical and critical thinking;
- through portfolios, project work, and evaluation rubrics, students develop creativity, collaborative skills, and a sense of responsibility;
- The application of innovative technologies strengthens effective cooperation, transparent assessment, and mutual trust between the student and the teacher.

Based on the research results, the following proposals are put forward:

- organization of practical training to prepare teachers for the use of simulation computer technologies;
- harmonization of national educational programs with modern digital technologies, international assessment standards such as PISA and TIMSS;
- widespread implementation of electronic platforms, virtual laboratories, and simulation programs based on artificial intelligence to support students' independent learning activities;
- development of individual learning strategies in accordance with the abilities, interests, and development dynamics of each student;
- creation of an integrated assessment system that covers not only the level of knowledge, but also indicators of creativity, communication skills, logical thinking, and personal responsibility.

In conclusion, the introduction of simulation computer technologies into the educational process is one of the effective methods for the formation and development of students' independent learning

activities. This approach serves to equip students with modern knowledge and practical skills, educating them as competitive, independent-thinking individuals capable of making innovative decisions in the labor market.

REFERENCES

1. Бестужев-Лада И. В. Рабочая книга по прогнозированию [Текст] / И. В. Бестужев-Лада. – М.: Мысль, 1983. – 430 с.
2. Брушлинский, А. В. Мышление и прогнозирование (логико-психологический анализ) [Текст] / А.В.Брушлинский. - М.: Мысль, 2004. - 229 с.
3. Венецкий И.Г. Математико-статистический анализ контроля учебного процесса по математике в вузе с применением ЭВМ.-М.:НИИВШ. 1975.-63 с.
4. Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268.
5. Зиёхўжаев М., Пулотов А.М. Ўқувчилар билим даражаларини прогноз қилишда Монте-Карло методи // Халқ таълими.-1998.-№5.-Б.76-77.
6. Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development*, 50(3), 43–59.
7. Pulotov A.M. O'quvchilar bilimi darajasini aniqlashda pedagogik tashxis usullaridan foydalanish. “Pedagogik mahorat” ilmiy-nazariy va metodik jurnal. 2024, №10, 69-72-betlar. ISSN 2181-6833.
8. Pulotov A.M. Pedagogik tashxisda milliy tarbiya qadriyatlarini qo'llashning metodik asoslari. “Fan va ta'lim integratsiyasi” ilmiy jurnal. 2025, №10, 203-207-betlar. ISSN: 2992-9210.