

PEDAGOGICAL OPPORTUNITIES OF GAME-BASED PROJECT ACTIVITIES IN DEVELOPING RESEARCH SKILLS

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Annotation. This article analyzes the pedagogical possibilities of game project activity in developing research skills in high-grade students. In the modern education system, one of the important tasks is to develop research skills such as independent thinking, problem solving, information search, analysis and drawing scientific conclusions. From this point of view, the combination of game education and project-based learning technologies allows increasing the activity of students in the educational process, strengthening their motivation, and connecting theoretical knowledge with practical activities.

Keywords: game-based education, project activities, research skills, STEAM education, senior students, innovative pedagogy, competence, Game-Based Learning, Project-Based Learning.

Introduction. The reforms implemented in the education system require students to be directed to independent research, scientific thinking and problem-solving, rather than to assimilate knowledge ready-made. Among the skills of the 21st century, research skills, along with critical thinking, creativity, collaboration and communicative competencies, are of particular importance. Especially in preparing senior students for higher education and future professional activities, one of the important tasks is to develop the ability to conduct scientific research, analyze data and draw informed conclusions.

In traditional teaching methods, students often participate as recipients of ready-made knowledge. As a result, their independent thinking, research and creative approach are not sufficiently developed. Therefore, modern pedagogical technologies, in particular, game-based learning (Game-Based Learning) and project-based learning (Project-Based Learning) methods, are being widely introduced into the educational process. These approaches encourage students to solve real problems, search for information, conduct experiments, and work in a team. Modern systematic reviews also show that project-based learning in a STEAM environment develops students' activity, creativity, and research skills.

Game-based project activities combine the advantages of game elements and the project method into a single educational process. In this approach, students encounter a specific problem situation, study it, search for the necessary information, analyze various sources, and ultimately present a practical product or solution. Game elements increase students' interest in the lesson, strengthen their internal motivation, and encourage them to actively participate. Research shows that the combination of gamification and project-

based learning has a positive effect on the development of student activity and higher-level thinking skills.

Research skills include the student's ability to identify a problem, ask questions, collect information, analyze evidence, draw conclusions, and present results with justification. The development of these skills is more effective through methods based on practical activities than through traditional lessons. Therefore, game-based project activities are one of the effective pedagogical tools for the formation of research competence.

This study revealed that the pedagogical potential of game-based project activities is manifested in the following areas:

- ☐ increasing students' motivation for learning;
- ☐ developing independent and critical thinking;
- ☐ forming information search and analysis skills;
- ☐ developing a culture of teamwork and effective communication;
- ☐ improving the ability to find creative solutions to problems;
- ☐ developing skills in presenting research results and evaluating one's

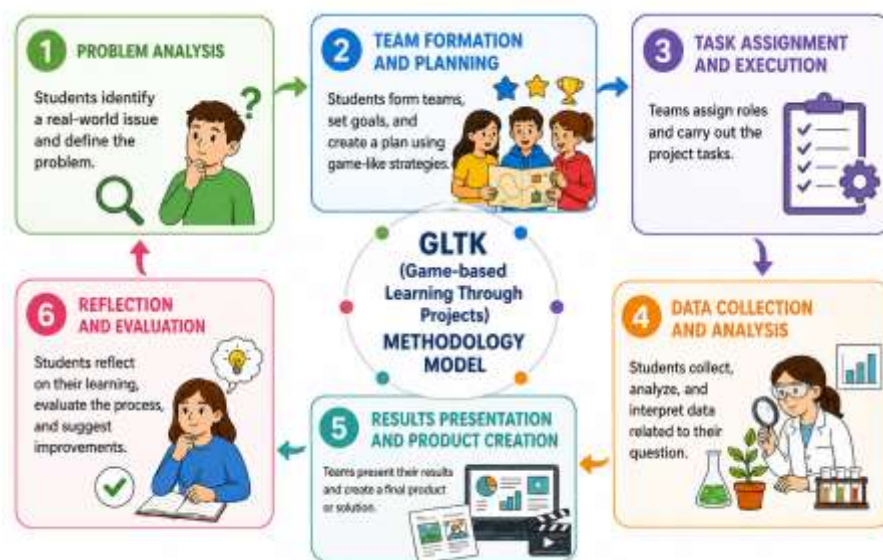
own work.

Thus, game-based project activities not only strengthen students' knowledge of the subject, but also prepare them to acquire the research competencies necessary for future scientific research and professional activities.

As part of this study, a GLTK (Game-based Learning Through Projects) methodological model was developed, aimed at developing research skills of senior students through game-based project activities. The model serves to gradually organize students' research activities and is based on the integration of the project method with game tasks.

The model includes the following six stages:

Picture 1. Stages of the GLTK (Game-based Learning Through Projects) methodological model





In this scheme, the GLTK (Game-based Learning Through Projects) methodological model. In the first stage of the model, a real-world problem of interest to students is identified, and in the second stage, research-oriented activities are organized based on role-playing games, quests, and game elements. In the third stage, the project goal, objectives, and implementation plan are developed. The fourth stage covers the research process and involves collecting data, observing, conducting experiments, and analyzing the results obtained. In the fifth stage, students create and present a project product (report, poster, video, or presentation). In the final stage, reflection and evaluation are carried out, the work done is analyzed, the results achieved are evaluated, and conclusions are drawn on improving further activities. This model serves to develop students' critical thinking, creativity, collaboration skills, and problem-solving competencies by integrating game technologies, project-based education, and research activities into a single pedagogical process.

The peculiarity of this model is that game elements increase students' motivation, while project activities direct them to practically carry out all stages of scientific research. As a result, students develop not only knowledge in science, but also research, collaboration, and problem-solving skills. This approach is consistent with the competency-based approach emphasized in modern research on STEAM and project-based learning.

Conclusion. Developing research skills in high school students is one of the priority tasks of today's education system. The results of the study showed that game-based project activities effectively develop students' skills in independent thinking, information search, analysis, problem solving, and presentation of results. Game elements increase students' motivation, and project activities involve them in the process of practical research. The GLTK (Game-based Learning Through Projects) model proposed in the article combines the advantages of game-based learning and project-based learning in a single pedagogical system. The step-by-step structure of the model serves to consistently organize students' research activities and develop their critical thinking, creativity, collaborative culture, and communicative competencies.

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