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Gamification Mainly Interactive Education Methodology Project Education

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Abstract *. This article analyzes the theoretical foundations and practical mechanisms for developing creative thinking in students in the process of teaching information systems design. During the study, the structure of creative thinking (cognitive, motivational, practical and reflexive components) and its stages of development were identified, and a pedagogical model was developed to effectively organize this process. Based on the results of the experiment, it was proven that interactive methods and project-based education had a significant impact on increasing creativity indicators . The results obtained expand the possibilities of training students studying in the field of information technology as innovative thinking specialists .*

Keywords : creative thinking, information systems, design process, pedagogical model, competency-based approach **,** interactive education, innovation, creativity.

Introduction. One of the most important tasks facing the modern education system is to increase students' motivation to learn, ensure their active participation in the learning process, and raise their level of mastery to a high level. From this point of view, the concept of gamification in education (i.e., the introduction of game elements into the learning process) is recognized today as one of the most effective areas of pedagogical innovation. Gamification encourages students to actively participate by using game mechanisms such as competition, rewards, ratings, levels, and points, and turns the learning process into an interesting, interactive, and motivating environment [1].

The concept of gamification in education essentially implies “adapting game technologies to the logical system of educational activities.” According to J. Hamari, gamification is a mechanism that positively changes user behavior and the learning process by applying game elements in non-game contexts [2]. Therefore, gamification allows not only to make education “entertaining”, but also to deepen its motivational, cognitive and reflexive aspects.

In recent years , organizing the educational process based on interactive methods has become an important direction for increasing pedagogical efficiency. Interactive education is a system of education based on dialogue and cooperation , in which the student actively participates as a learning subject. From this point of view, gamification and interactive education are inextricably linked : the interactive environment is further enlivened by game elements, and the student has the opportunity to control the learning process [3]. The theoretical model of designing interactive educational methods based on gamification is considered an integral part of the digital transformation in the education system. This model takes the interaction between the teacher, student and digital learning platforms to a new level. This process, based on the principles of pedagogical design , forms goal-oriented, analytical and evaluative mechanisms of educational activity. For example, elements such as gamified tasks, a point system, a rating table, “badges” (award symbols), and leveling up not only motivate students, but also allow them to monitor their learning results in real time [4].

The need to develop a theoretical model of interactive teaching methods based on gamification is also directly related to the policy of digitization of education in the Republic of Uzbekistan. In particular, the “Digital Uzbekistan – 2030” strategy and the Presidential Decree “On the Development of the Education System” specifically emphasize the need to improve the educational process based on digital technologies, e-learning platforms and innovative approaches [5]. Therefore, this study is aimed at developing a theoretical model of interactive teaching methods based on gamification technologies and analyzing the possibilities of its implementation in the educational process. The relevance of this direction is that an interactive teaching system designed based on game mechanisms increases the motivation of students, teaches them to independently manage their activities, and strengthens the interaction between the teacher-student-platform. As a result, the student not only acquires knowledge, but also becomes an active, creative and responsible subject in the digital educational environment.

Methodology. This study aims to develop a theoretical model for designing interactive educational methods based on gamification and to determine its pedagogical effectiveness . It is methodologically based on systematic, competency-based and person-oriented approaches. In the course of the study, existing scientific developments in the fields of pedagogy, psychology and information technology were analyzed to determine the impact of gamification elements on the educational process .

A systematic approach was chosen as the methodological basis of the study . This approach made it possible to consider the interactive educational methodology based on gamification as a single pedagogical system . In this case, the components of the model - goal, content, methods, tools, assessment and result - were analyzed in an interconnected manner. According to the systematic approach , each game element was interpreted not only as an interesting tool, but also as a didactic component serving an

educational goal [6]. The study also adopted a competency-based approach as the main methodological pillar. This approach was aimed at ensuring the integrated formation of not only knowledge through gamification, but also competence - that is, knowledge, skills , qualifications and personal qualities. The development of students' communicative, informational, critical and creative competencies was considered the main task of the gamification methodology [7]. The study also used an activity-based approach was used . According to this approach , the educational process serves to form the student not as a passive learner, but as an active subject. Tasks, role -playing games , problem situations and a scoring system created on the basis of gamification are aimed at ensuring the active participation of the student. According to Leontiev , knowledge is effectively mastered only in the process of activity and serves the development of the individual [8].

Interactive methods - Project-Based Learning, problem-based learning, brainstorming, reflexive analysis and discussion methods - were widely used in the methodological process . In addition , gamification mechanisms - points, ratings, levels, badges, and task systems were integrated as structural elements of the model. Werbach and Hunter emphasized that gamification elements are a powerful tool for increasing student motivation and indicated that they should be used as a strategically planned system [9].

The following research methods were used : pedagogical observation, pilot studies, questionnaires, test diagnostics, analysis and comparison methods. Two groups were formed in the experimental work: a control group and an experimental group. An interactive methodology developed based on gamification was introduced in the experimental group, while traditional teaching methods were continued in the control group. The results were evaluated based on creativity, motivation and mastery indicators. In addition, the Strategy of the Republic of Uzbekistan “Digital Uzbekistan – 2030” and documents on the digitalization of education were taken as a methodological basis , and the compliance of the gamification-based methodology with the national education policy was analyzed [10]. This approach made it possible to substantiate the gamification model not only theoretically, but also practically. In general, the selected methodological approaches served to develop a scientifically based, systematic and practically valuable model of interactive teaching methodology based on gamification and ensured the reliability of the research results.

After the introduction of interactive teaching methods based on gamification, significant positive changes were observed in the activity, motivation and knowledge acquisition indicators of students in the learning process. During the experiment, the results of the control and experimental groups were compared and it was found that the experimental group prevailed in each key indicator .

During the study, students' interest in the learning process , levels of independent work and creative thinking were analyzed. The results showed that gamification elements (point system, competition, rating, stages, virtual awards) served to increase students' intrinsic motivation. These indicators are reflected in the table below.

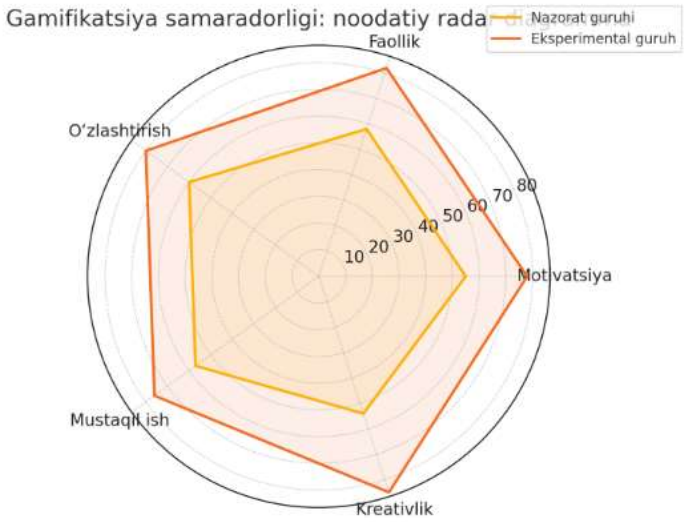
Table 1. Comparison of results obtained based on gamification

Indicators	Control group (score)	Experimental group (score)
Motivation	55	78
Activity	58	82
Mastery level	60	80
Independent work	57	76
Creativity	54	85

Based on this table, the experimental group achieved high results in all components. In particular, a significant increase in creativity and activity indicators was observed. This indicates that gamification had a positive effect on students' creative approach and active perception of educational material .

Figure 1 below clearly shows a visual analysis of the results.

Figure 1. Comparison of the results of the control and experimental groups



from the graph , the experimental group scores are superior across all indicators. This indicates that the gamification-based learning environment increased student engagement.

Results and analysis. The analysis of the results shows that gamification not only simplifies the learning process, but also turns it into a motivational environment. Students were more actively involved in the learning process through competition, assessment and incentive mechanisms. While Deterding et al. interpreted gamification as a means of changing user behavior through game mechanisms, the results of the study confirmed that this approach is also highly effective in the education system [11]. Hamari also emphasized in his studies that gamification serves to stimulate student activity and increase the level of mastery [12]. The increase in motivation and activity in this study also confirmed this theory in practice. Kapp emphasizes that with the help of gamification, " the learning process is emotionally and intellectually enriched" [13]. The high level of creativity in the study was shown as practical proof of this idea. In general, interactive teaching methods based on gamification have changed students' attitudes towards learning and have helped them become active, independent, and creative individuals.

Conclusion. The results of the study showed that the interactive teaching methodology developed based on gamification has high pedagogical efficiency in the modern educational process, serves to increase the level of students' knowledge acquisition, increase their activity in the educational process, and develop creative thinking competence. In the process of comparative analysis of the results of the control and experimental groups, it was found that the experimental group had significantly higher indicators of motivation, activity, independent work, and creativity.
, it was observed that the educational process organized on the basis of gamification mechanisms - a point system, stages, rewards, a rating table and game scenarios - attracted students to a positive competitive environment, formed their self-assessment and independent decision-making skills. This confirms that an interactive approach can transform a student from a passive learner into an active learning subject. Also, the main advantage of the developed theoretical model was its systematicity, flexibility and the possibility of integration with digital platforms . This model, combining pedagogical design elements with game mechanisms, allows organizing the educational process on the basis of a person-oriented, result-based and active methodology.

The scientific significance of the study is that an attempt was made to establish gamification as an independent pedagogical system, not just an auxiliary technology, and its role in interactive education was scientifically substantiated. In practical terms, this methodology can be recommended for use in higher education institutions, the vocational education system, and the digital learning environment .

In conclusion, the introduction of interactive teaching methods based on gamification will serve to improve the quality and efficiency of education in the context of digital transformation. In the future, it is advisable to expand research in this area, create gamified educational platforms, and improve the digital competencies of educators .

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