Game technologies in education as a way to enhance the cognitive activity of students

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Abstract. A specific feature of the modern educational services market is a high degree of global competition. In this regard, the use of the most advanced technologies and teaching methods is becoming one of the main competitive advantages of an educational organization. Games are one of the modern interactive teaching methods. The feasibility of using educational games in the educational process is analyzed in the article. The lack of application of an exclusively traditional teaching model in modern conditions has been substantiated. The need to apply new approaches is determined both in terms of enhancing the cognitive activity of students, and from the standpoint of updating the human capital of the academic environment, professional growth of the teaching staff. This fully applies to business education, where the ability to respond to various challenges and new trends is imperative for successful development. The study aimed to study the possibility of using educational games in the preparation of students studying economic disciplines. The task was to develop a version of the game. The methods of abstraction, observation, comparison, experiment were used in the course of research. This article describes an educational game developed by the authors for students majoring in “Microeconomics”, analyzes a number of characteristics of the developed game by examining it through “lenses”. Highlighted competencies, the formation of which is facilitated by participation in this game. The emphasis is made on a number of limitations inherent in the game method of teaching. The main results of the developed game with students majoring in “Economics” and “Management” are described. The prospect of using the game approach in the practice of education is grounded.

Keywords: educational game, education, competencies

1 Introduction

Currently, various kinds of games are widely used in the practice of teaching at various levels (from preschool to MBA, for example). On the one hand, this direction of the development of pedagogical practice is related to an understanding of the complexity of the objects and phenomena being studied, on the other hand, it is related to understanding that a

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game is an effective way to immerse oneself in the process being studied comprehensively and deeply.

The fact that in the educational environment the understanding of the effectiveness of a game as a way of cognizing the surrounding reality has been established is confirmed by a large number of various training activities in this area [1-3]. However, the academic environment does not always easily accept this way of teaching, considering it not “serious” enough. Nevertheless, the pace of appearance of the innovations in our lives leads to the fact that the traditional teaching model (the teacher is the main source of knowledge) is rapidly becoming obsolete. The explanatory-illustrative teaching method applied in practice basically presupposes the transfer of the ready-made conclusions of science by the teacher to the students. At the same time, even the use of methods of students’ search activity does not negate the fact that the transmission of ready-made conclusions to students dominates [4]. This approach does not contribute to enhancing the cognitive activity of students. The use of exclusively traditional teaching methods does not contribute, among other things, to the renewal of human capital in higher education, and leads to an outflow of potential young teachers and researchers [5]. Educators at all levels need to learn new skills, techniques and learning tools. One of these innovative tools is the game. If initially the games market was aimed mainly at satisfying the need for entertainment, now there is a huge number of so-called “serious” games. There is an increase in the number of publications related to educational games [6]. The effectiveness of the use of games in the educational process is confirmed by a number of studies [7], the high potential of game techniques in education is described by various authors [8-11]. At the same time, researchers note a number of problems, such as the lack of unified methodological approaches to assessing the effectiveness of the applied game teaching methods, which is a problem for stakeholders in the field of education and game developers seeking to find innovative tools that can help improve student learning outcomes [6]. The authors also note the need to test claims about the benefits of, for example, computer games in education through rigorous research and substantiate them based on evidence-based theories about how people learn [12].

The purpose of this work was to study the possibility of game learning and the use of game technologies in the educational process.

The task of the research was the development of an educational game and its application in the educational process. The development of the game was carried out within the framework of training at the Tyumen State University under the program “Game methods in education. Principles. Theory. Practice”. Speaker – Roman Krylov.

As an example, the authors have chosen the creation of a game for students studying the discipline “Microeconomics”.

2 Methods

The methods of abstraction, observation, comparison, measurement, experiment were used in research.

3 Results

As a rule, the topic “General equilibrium and economic efficiency” is included in the course of Microeconomics. The possibility of achieving a simultaneous state of equilibrium in all competitive markets and maximization by each economic entity of its objective function under given constraints is considered. In this case, the question naturally arises – will the achieved equilibrium state of the economy be effective? To illustrate what happens at the

level of an individual decision-maker, a model such as “The Robinson Crusoe Economy” is initially considered. This model served as the initial idea of our game. Robinson Crusoe Economy considers an economy with one consumer, who is also the producer of one or two goods. At the same time, Robinson acts as a rational producer, trying to maximize profits maximizing utility at the same time as a rational consumer. The possibility of exchange (trade) is introduced by an additional character – Friday. However, such a small number of characters provides too few opportunities for gamification. For the game to become a team game, we increased the number of characters to six. To include the need to analyze possible risks in the game, random events were also built into the game. The game was named “Robinsoniade”.

Experienced game designers recommend starting a game development by looking at it through a series of “lenses”, for example: Experience, Surprise, Fun, Curiosity, Value, Problem [13]. Consider the decomposition of our game presented in the table.

Table. Consideration of the projected game through the “lenses”.

Lens	Feature: question – answer
Experience	What kind of experience do we need to share with the players? Experience in the rational allocation of limited resources
Fun	What can be a pleasant / interesting surprise for a player? The presence of random events in the game that can significantly affect the result
Curiosity	What questions does the game raise in the player’s mind? Which solution will be optimal in this case and why? What are you doing to keep the player interested in these questions and the answers to them? The game shows the need for knowledge of the principles of economics. Without them, the player will not be able to “survive”. How to stimulate the players' curiosity? Think over more complex, non-linear scenarios with different outcomes that depend on the player’s decisions
Problem	What problems are stated in your game? Players must realize that the best way to win is to act rationally. Does your game have hidden issues that arise as part of the game? As a hidden problem, we lay the presence of some random events that will affect the number of resources, regardless of how the players acted before their occurrence
Value	How can your game generate new problems instead of the solved ones? Solving one problem does not solve the problem once and for all, but creates a new problem of a higher level.

The authors have developed the rules of the game, the playing field, character cards, random event cards, etc. An image of the playing field is shown in the figure.

Fig. The playing field of the “Robinsoniade”.

According to the legend of the game, six players, each of whom has one significant ability that other players do not have, find themselves on a desert island. The game is divided into twenty-one rounds. In each round, players have a limited number of game actions that allow them to extract resources. The main goal of the game is to survive in conditions of limited resources. However, with a competent distribution of resources and the presence of a certain amount of luck (random events), players can not only survive, but also accumulate a certain amount of resources and finish the game with a positive result. The “miraculous rescue” of all those who managed to survive takes place during the twenty-second round. When several teams play simultaneously, the winner is the one who managed to survive and accumulate the greatest amount of “gold”.

4 Discussion

Apart from the entertainment purpose, this game is aimed at developing a whole range of skills in the players. For example, participation in the game help 1-year students majoring in 38.03.01 “Economics” and “Microeconomics” to form the following competencies provided by the educational standard [14]:

GC-3 – the ability to use the foundations of economic knowledge in various fields of activity;

GPC-2 – the ability to collect, analyze and process data required to solve professional problems;

GPC-4 – the ability to find organizational and managerial decisions in professional activities and be responsible for them;

PC-9 – the ability to organize the activities of a small group created for the implementation of a specific economic project;

PC-11 – the ability to critically assess the proposed options for management decisions and develop and substantiate proposals for their improvement, taking into account the criteria of socio-economic efficiency, risks and possible socio-economic consequences.

The pilot game was played by the students of the Institute of Economics and Management of Industrial Enterprises named after V.A. Romenets of NRTU MISIS and showed good potential and the possibility of its application in teaching practice. Several more game iterations showed the need for some changes and additions to the developed version of the game. Thus, one of the rules and a prerequisite for victory was the team keeping records of the results of each round and the presentation of the results in the form of a report of a given form at the end of the game. The presence of the report makes it possible to assess at the end of the game the activities of the players, to analyze the effectiveness of the decisions made by the players.

Depending on what kind of students are participating in the game, it is possible to complicate or simplify the course of the round. For example, when the game is played by students majoring in economics, an additional condition is introduced at certain rounds: the need to solve the proposed problems in order to move to the next round. When the game is played by the students majoring in other subjects, no additional complication is required.

The conducted sections of students' knowledge on the relevant topic showed that the share of good and excellent marks in the groups participating in the game was 30% higher than in the groups that did not participate in the game.

The developed game is quite simple and can be played by first-year students. In senior courses, the games used in teaching should be more complicated to contribute to the acquisition and development of professional skills and abilities. Games that develop the skills of enterprise management, assessing commercial and other efficiencies of production, investments and innovations can give a significant effect. In modern conditions, there is a demand for specialists who are able to assess the efficiency of the production of high technology products [15], which means the need to develop these skills in the learning process. The working in this direction should be continued. The development and application in the learning process of business games corresponding to this request will increase the effectiveness of training and make graduates more in demand in the labor market.

5 Conclusion

Thus, using games in education is of high potential, which is not fully used currently. Certainly, the use of game method has a number of limitations. Thus, a model of any complexity, implemented in a game, will nevertheless be a simplification of reality, which in all cases will turn out to be more complex than the model. Making a play requires certain skills not only for the players, but also for the playmaker. The involvement of the players in the process, the occurrence of tension and conflicts during the game will often depend on his actions. The process of distribution of roles and the correspondence of a particular player to the role assigned to him will be of great importance.

The fact that participation in the game requires active interaction of the players with each other and with the playmaker, instead of the role of a passive listener and observer, speaks in favor of using the game teaching method along with the traditional ones. The use of games is an innovative way of conveying information that makes it possible to go beyond clear normative boundaries in organizing the learning process and bring creative, original methods to the educational process.

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