

TEACHERS' ATTITUDE TO EDUCATIONAL GAMES IN BULGARIAN SCHOOLS

Elena Paunova¹, Valentina Terzieva², Yanina Stoimenova³, Petia Kademova-Katzarova⁴

^{1,2,3,4} *Institute of Information and Communication Technologies - Bulgarian Academy of Sciences (BULGARIA)*

Abstract

Adolescents nowadays are accustomed to the use of ICT in their daily lives and perceive quickly and naturally the information obtained from them. The game brings a few basic features (edutainment, easy skill and knowledge acquisition, exploiting curiosity) that are valuable for the perception and assimilation of school subjects (in fact it is a key driver of human progress). Serious games are a powerful tool for improving education outcomes due to their ability to hold attention and to present realistic simulations of the matters learned. Learning games are appropriate for the purposes of schooling, as students are an active part in learning process and the knowledge obtained in a pleasant way retains for longer in memory. Science is aware of this opportunity, but at the same time the education community is at the very beginning of an appropriate usage of games for teaching and training at schools. Serious games enter some schools in Europe, but still they are not popular in many countries. A combination of several conditions is necessary to change the style and techniques of teaching: technical equipment in classrooms, creating learning games that correspond to subject curriculum, a positive attitude of teachers. This study examines the attitude of teachers in Bulgaria to educational games. The teachers' opinions are collected through a survey conducted in several schools from different towns. We present an analysis of their attitudes depending on several factors: teacher's age, teacher's subject, and the age group of students. The obstacles for serious games' wide usage in Bulgarian schools are discussed. In addition, we give some considerations about which types of learning games seem to suit implementing different pedagogical methods in particular subjects. We hope that the analysis and conclusions made in this paper can be useful for teachers and educational authorities to understand the need of ICT-based games that are effective not only for entertainment but also as a teaching tool.

Keywords: Serious games, educational games, ICT, teaching.

1 INTRODUCTION

Adolescents nowadays are accustomed to the use of information and communication technologies (ICT) in their daily lives and perceive quickly and naturally the information obtained from them. The game brings a few basic features (edutainment, easy skill and knowledge acquisition, exploiting curiosity) that are valuable for the perception and assimilation of school subjects (in fact it is a key driver of human progress). Serious games are a powerful tool for improving education outcomes due to their ability to hold attention and present realistic simulations of the matters learned.

Game-based learning (GBL) is a training method gaining popularity in many countries in different continents. This method of training students at school has significant advantages over classical teaching: students are motivated to learn; they are an active part in learning process [1]; the information obtained in a pleasant way retains for a long time in memory [2]; students have a positive attitude towards the subject [3].

Etymologically, the word "school" comes from Greek skhole "spare time, leisure, rest ease; idleness; that in which leisure is employed; learned discussion" [4]. The initial idea for the school has been to learn in a pleasant way, which means that games are not inimical to schooling.

Serious games enter some schools, but still they are not popular in many countries. A combination of several conditions is necessary to change the style and techniques of teaching: technical equipment in classrooms, creating learning games that correspond to subject curriculum, a positive attitude of teachers. This study examines the attitude of teachers in Bulgaria to educational games and their use in and out of class.

The teachers' opinions are collected through a survey conducted in several schools from different towns. The obstacles for serious games' wide usage in Bulgarian schools are discussed. In addition, we give some considerations about which types of learning games seem to suit implementing different pedagogical methods in particular subjects.

2 BULGARIAN TEACHERS AND EDUCATIONAL GAMES

All the teachers who answered the questions worked in state or municipal schools. The study does not cover private schools, as this is the subject of future research. The focus is on the teachers at primary and secondary school. The total number of teachers who completed the survey is 71. The teachers were of various age and experience with students. Most teachers who completed the survey teach taught exact sciences, information technology and mathematics. However, there are answers from teachers in Bulgarian language and literature, history, biology, sports and music.

In the survey, the teachers were asked to comment on specific aspects of learning, using computer games and information technologies. The teachers shared their hopes and concerns about the use of this type of electronic products. Moreover, they had the opportunity to express their opinion in free text and to insert answers to the questions. In their responses, the teachers expressed their views regarding the barriers to the implementation of educational games in teaching, as well as regarding the negative aspects in their usage. The survey was spread both on-line and printed, so it could also be completed by the teachers who did not use computer.

Approximately a half of the respondents did not answer the different questions related to educational games. The probable reason for this is that they are not used to the concept of entertaining education. Therefore, the presented values for all the posed questions of this type, presented hereafter, are calculated with respect only to a respective subgroup of the respondents.

In students' training process, over half of the respondents (52 %) use ICT products developed for their subject. About 18 % of the teachers responded that they know about products developed for their subject, but do not use them. Only 6 % indicated they use educational games in learning process. 20 % do not know about ICT teaching materials and games for their subject. There is a trend to an increase in the number of the teachers who use various educational ICT materials in their daily work. In specifying the products used by teachers, however, it appears that in practice educational games are not used. Further in the article the causes for this fact are discussed and considerations are made for measures that would facilitate the entry of educational games in Bulgarian schools.

Another issue on which the teachers were asked to comment was "What are the obstacles to the use of ICT products and learning games in school practice?". The answers to this question gave important guidelines for the activities necessary to promote the use of ICT products and, in particular, educational games in Bulgarian schools. According to the teachers, the three most serious obstacles are: the lack of teachers' training (43 %), the lack of appropriate products (36 %), and the lack of technical resources in schools (39 %). Other frequently mentioned barriers are: the teachers' attitudes (28 %), preparation time (25 %), price (30 %), the inconformity of existing products to the distribution of learning matter (16 %), the lack of time for game insertion in the distribution of learning matter (27 %). A small number of teachers indicated the following potential barriers: distracting students from learning process (14 %), the possibility of overexposing students' emotions (5 %), the students' attitude (2 %), the parents' attitude (2 %). None of the teachers pointed out as an obstacle: the failure to achieve training objectives; problems with rating. Some of the respondents stated that there are no obstacles to the implementation of ICT products and educational games in school practice (4,5 %). The diagram of the teachers' opinion about obstacles to the use of ICT products and learning games in school practice can be seen on Fig. 1.

Most teachers (80 %) believe that educational games are rather useful for students to prepare their lessons, whereas only 3 % believed that they are not useful. None of the respondents chose the statement that educational games are rather harmful than helpful. These responses indicated a positive attitude by the teachers to the use of educational games in teaching and practicing the learning matter at school.

The teachers were asked if they would participate in the development of gaming or other ICT products for educational purposes. The majority of the teachers (52 %) stated that they had not thought about such activity. 34 % answered positively and only 7 % of the respondents answered that they would not participate in the development of gaming products.

The teachers gave different answers to the question "What students' age is appropriate for entering educational games in learning process?". The majority (43 %) responded that the best age is from 6 to 10. Also a large number of the teachers (21 %) believe that educational games are appropriate for early childhood. According to 23 % of the respondents, educational games should be offered to students between the ages of 11 and 15.

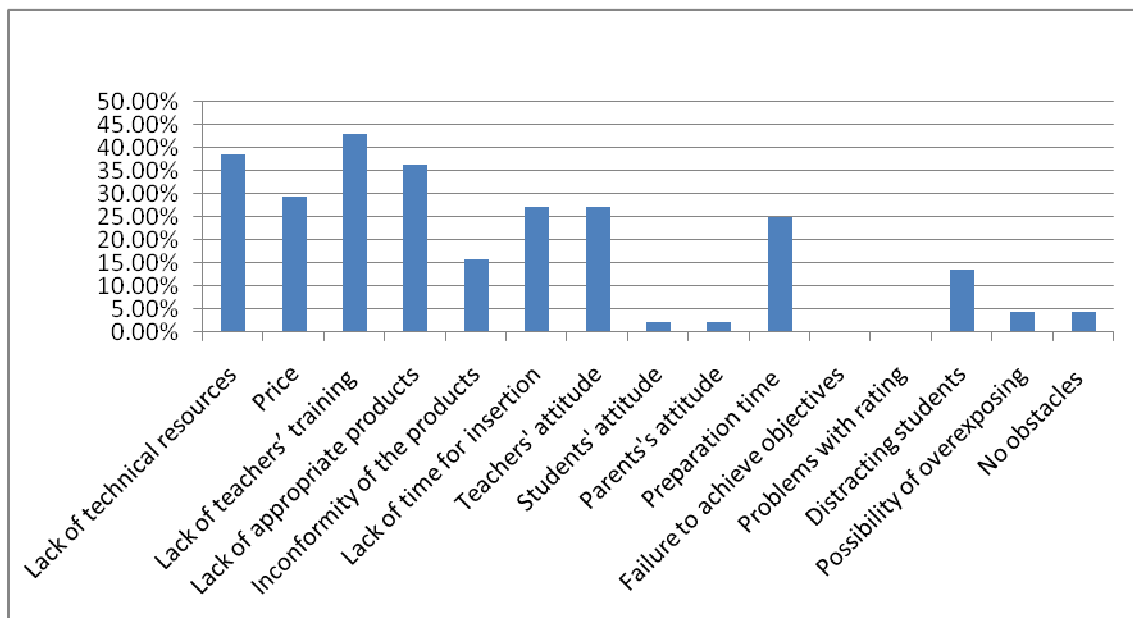


Fig. 1 Obstacles to the use of ICT products and learning games in school practice

The teachers were also asked in which learning situations the use of educational games is appropriate. 59 % responded that it is appropriate to use games in class, while 41 % believed that it is appropriate only partially. A large number of the teachers (72 %) responded that educational games are appropriate for exercising studied matter. It also becomes clear from the answers that most teachers would not use games to evaluate acquired knowledge. However, the teachers believed that games are suitable for achieving specific learning goals (56 %) [5]. Also, a large number of the teachers (84 %) believe that educational games are suitable for use at home. Another relevant application of educational games according to the teachers are extracurricular activities (85 %) and their use as a stimulus or reward for students (76 %) [6]. More than a half of the teachers (63 %) believed that games are suitable for an alternative form of education, the so-called game-based learning (GBL). Fig. 2 shows the diagram of learning situations that are appropriate for using educational games, according to the teachers.

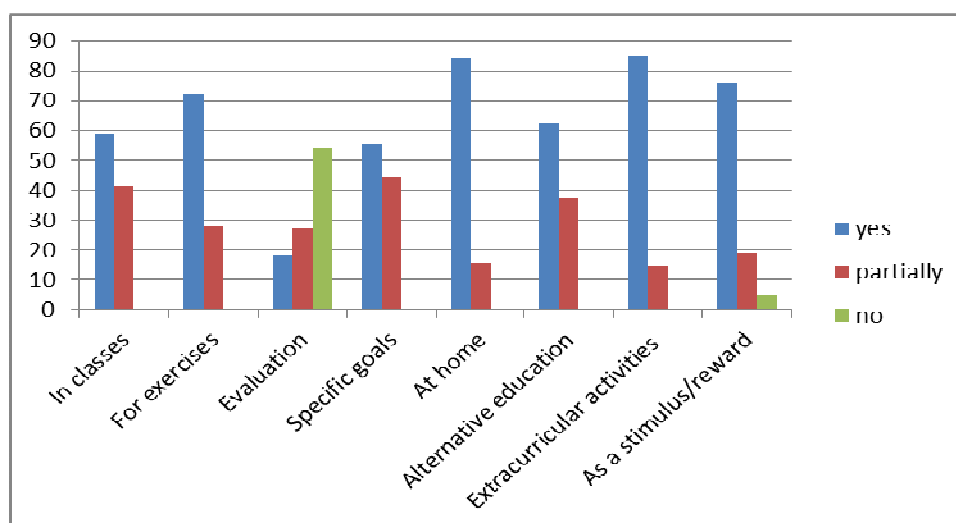


Fig. 2 Learning situations appropriate for using educational games

The teachers had the opportunity to add free-form responses. Some of them explained that it is good to use regularly gaming products according to teacher's opinion, and the application can be in all areas. Another teacher stated that the use depends a lot on the subject of study, and added that classes in IT are the most appropriate to use this type of products, but in the other subjects the latter may also be applied.

The teachers were asked to consider the impact of using educational games on students in learning process with respect to certain parameters. According to them, games have a positive impact on the following indicators: receptiveness to learning matter (invisible learning) – 92 %; opportunity to exercise – 88 %; effectiveness of learning process – 78 %; educational achievements – 61 %; new forms of education – 90 %; development of different skills – 92 %; active learning – 89 %; interest in the subject – 92 %; students' independence – 65 %; psychological relief – 89 %; new methods for knowledge extraction – 86 %; application of teaching methods – 79 %; constant feedback – 78 %; respect to teachers – 67 %; improving the relations between generations – 78 %; joining new technologies – 95 %; safe behavior in the Internet – 71 %. Fig. 3 depicts the teachers' answers about the impact of using educational games on students with respect to the parameters mentioned above.

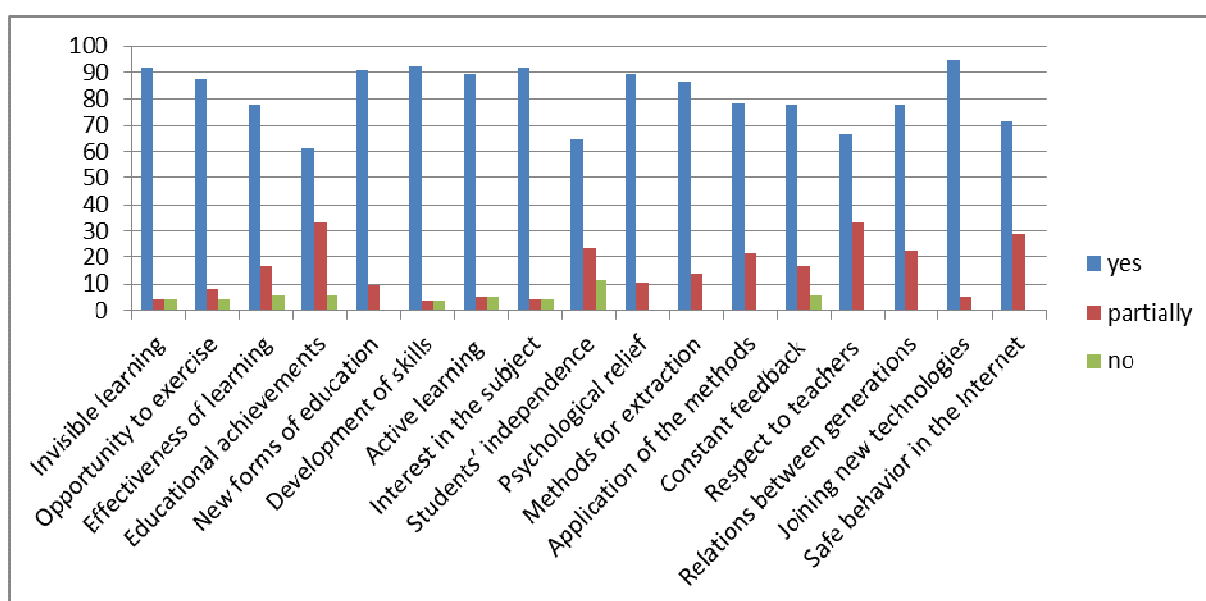


Fig. 3 Impact of using educational games on students with respect to given parameters

In free text, the teachers shared their opinion that games promote positive emotions from learning, the activity of students, as they may be explorers and discoverers. According to them, games are not suitable for knowledge testing and evaluating.

Another aspect of the use of serious games in learning process are the kinds of knowledge and skills for the acquiring of which gaming products are appropriate. According to 74 % of the teachers, by means of games, basic knowledge can be acquired (none of the respondents gave a negative answer), and 56 % believed that games are suitable for acquiring in-depth knowledge (22 % believed that games are not suitable for acquiring in-depth knowledge). 87 % believed that additional knowledge and skills for using ICT products can be gained through games. Almost the same percentage of the teachers (89 %) believed that educational games are suitable for acquiring specific skills, and 75 % answered that the games are appropriate for acquiring knowledge not included in learning matter. The teachers' attitude to the kinds of knowledge and skills for the acquiring of which gaming products are appropriate is shown on Fig. 4.

One of the teachers wrote that educational games are more suitable for acquiring practical skills than for theoretical ones. In laboratory classes and practice classes, the students are divided into groups and this allows the easier use of appropriate games.

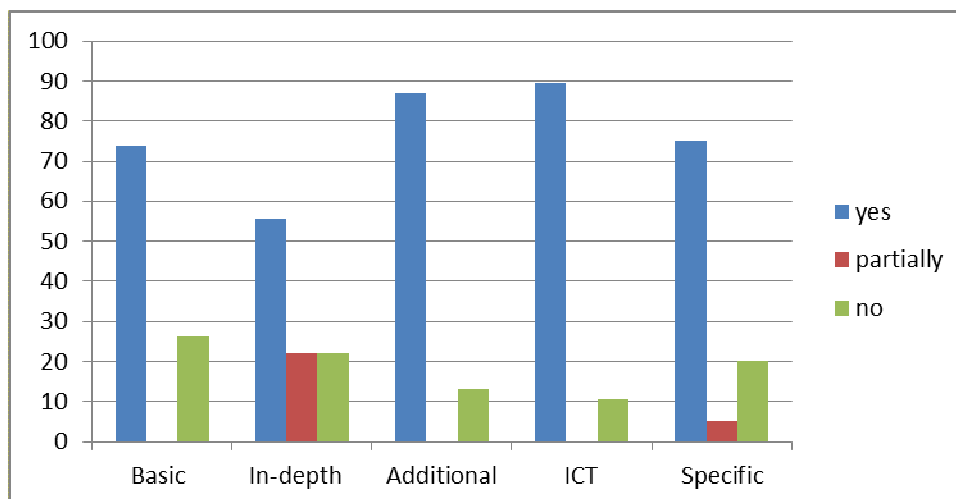


Fig. 4 Kinds of knowledge and skills for the acquiring of which gaming products are appropriate

The teachers had to answer the question "What qualities do you think that educational game products can develop?". They shared the following views on the indicated skills (the percentages of the teachers that gave positive assessment of the skill are presented in brackets): motivation – 64 %; self-confidence – 50 %; creativity, fantasy – 90 %; critical thinking – 60 %; logical thinking – 91 %; skills to solve problems – 75 %; memory – 82 %; emotional intelligence [7] – 83 %; competitive spirit – 96 %; visual-motor skills [8] – 81 %; ICT skills – 86 %; teamwork skills [9] – 65 %; social and communication skills – 67 %. The teachers' view about this aspect can be seen on Fig. 5.

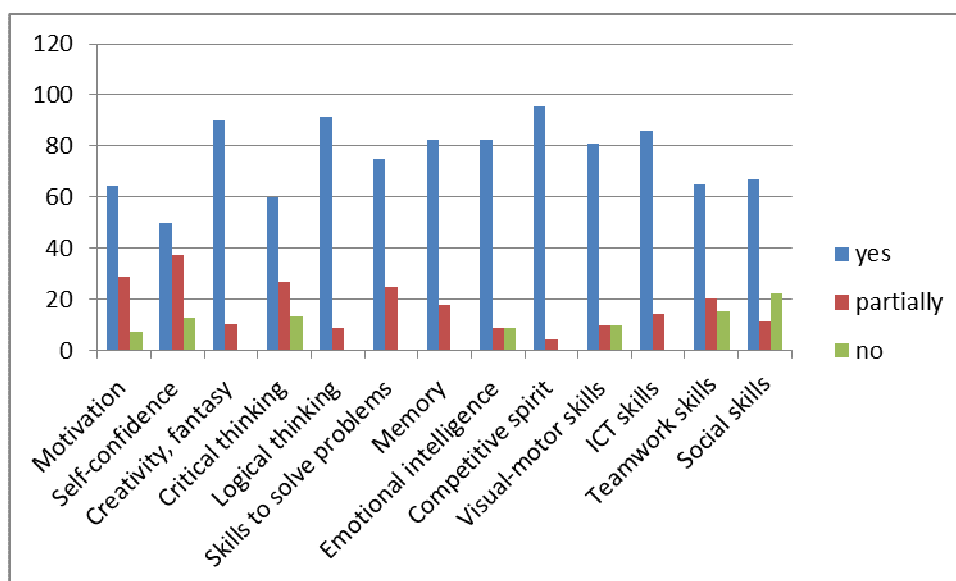


Fig. 5 Qualities which educational game products can develop

The teachers indicated the following disadvantages for them in the implementation of educational games in teaching practice: changing teaching style; lack of motivation; lack of appropriate ICT and gaming professional training; high cost of ICT and of the maintenance of necessary equipment; training of teachers; habituation of children to this way of work and breaking away from the tradition of oral teaching, writing and direct dialogue that is still irreplaceable; lack of technical means; students no longer read, think for themselves, and write, it is easier for them to use ready information (especially in teaching literature), they download ready themes and ready tests for exams. Some teachers do not think that gaming products can have a negative effect on their work. [11]

The teachers rated their new role in class after the inclusion of educational games: to organize and manage learning process – 78 %; to structure learning matter – 67 %; to form the presentation of structural units – 42 %; to select and adapt appropriate learning resources – 86 %; to teach knowledge on their subject – 64 %; to distribute tasks and roles – 73 %; to ask questions – 72 %; to provide

additional resources if required – 71 %; to moderate students' participation – 77 %; to assist with explanations and tips – 58 %; to monitor and analyze – 67 %; to focus actively on students – 69 %. This information is presented graphically on Fig. 6. The teachers completed also the following answers: routing and information role; teacher should conduct educational activities and ensure the coverage of state education requirements; educational games can complement teacher's work and maintain students' motivation.

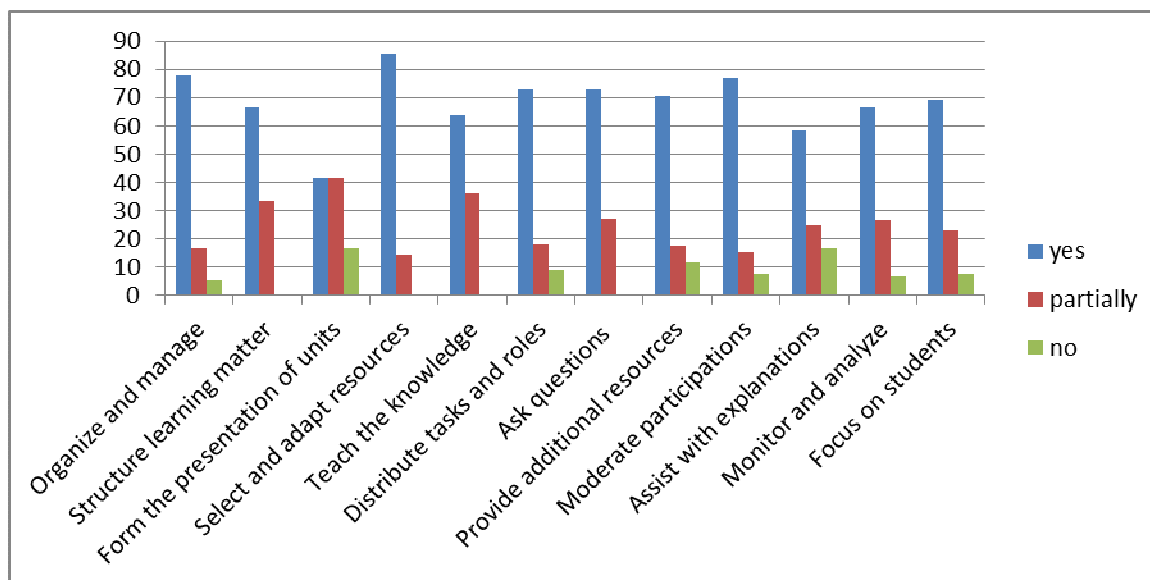


Fig. 6 Teachers' new role in class after the inclusion of educational games

We also examined the reasons why the teachers play educational games (Fig. 7). The majority (43 %) answered they play to develop their mental skills. A large number of the teachers indicated the reasons of curiosity (30 %) or professional purposes (27 %). A smaller part of them play to spend their free time (11 %) or play with their own children (14 %). Non of them had played educational games with friends. 18 % stated that had never played educational games.

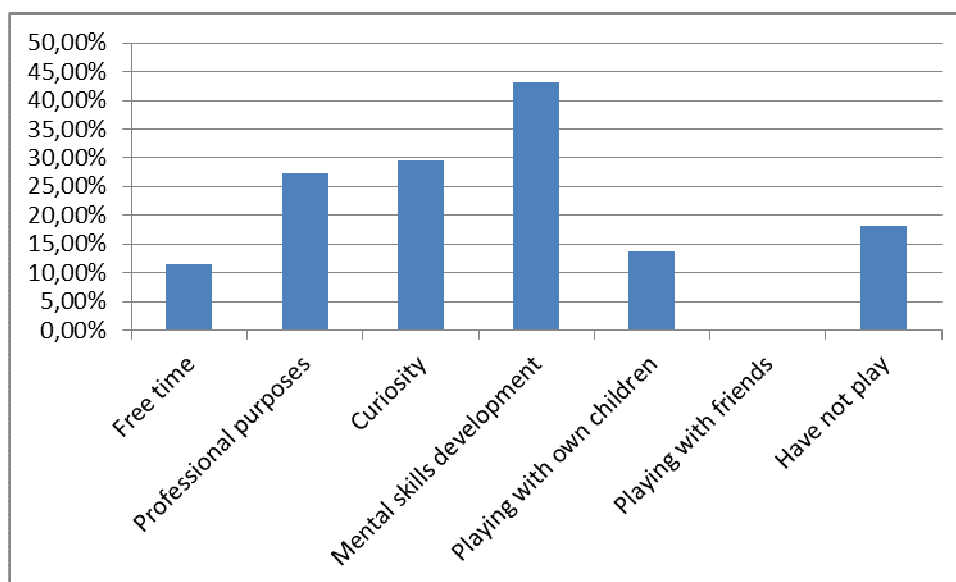


Fig. 7 Teachers' reasons for playing educational games

3 ACTIONS FOR STIMULATING THE USE OF EDUCATIONAL GAMES IN BULGARIAN SCHOOLS

The obstacles for serious games' wide usage in Bulgarian schools are discussed. For a wider expansion of educational games in Bulgarian schools, it is necessary to perform targeted actions. The recommendations in this section are derived, taking into account the obstacles to the use of educational games in school practice, which the teachers indicated, and the personal experience of the authors. As written above, the main obstacles according to the teachers are: the lack of training and teachers' attitudes, the lack of appropriate products and the lack of technical resources in schools' classrooms.

3.1 Improving the attitudes of teachers and their training for the use of educational games in teaching

The investigation revealed that the majority of Bulgarian teachers are not informed about the concept of educational games. This type of software products enters too slowly their everyday practices, and the reasons for that are complex. One of the main reasons is the extremely high average age of the teachers in Bulgaria – above 50 (because of low salary and brain drain). Most of older teachers are not familiar with the new technologies and prefer to teach, using traditional methods, which becomes boring, uninteresting and therefore ineffective for adolescents' education. In recent years, programs for incenting young teachers have appeared in the country, which will probably reduce the average age of teachers. Younger teachers are familiar with ICT products and their capabilities and tend to include these products in their teaching practice. Moreover, most young teachers have already experienced the enthralling force of computer games and would use it for the purposes of learning process. According to [10], people who have played since their childhood still keep on playing and are also searching for new types of games.

The effective use of educational games at school can be supported by training teachers in using the new technologies and educational games. Preferably, the training is to be done in extracurricular time and best during long holidays, so it would not stress the working time of teachers. The training would be suitable for young teachers and for their more experienced colleagues. Thus they would be informed about the existence of gaming products related to the theme on which they teach and would know how to use these products. In turn, they would recommend this use to their students in classes, extracurricular activities or at home. An additional advantage would be the planning of class hours for educational games in the different subjects, in which students have the opportunity to demonstrate their knowledge while having fun.

Besides encouraging younger teachers and training school teachers to use the new technologies and teaching methods, it is necessary to provide appropriate gaming products containing required course content. The institutional support, especially from the Ministry of Education and Science (MES), is very important to purchase educational games or pay for the creation and maintenance of free gaming applications for educational purposes.

3.2 Creating appropriate products

The in-class use of educational games containing information about a subject matter, but not corresponding to the distribution of the matter, would be partially useful for learning process. The benefits of games would be multiplied, if they follow the sequence of lessons and include all the topics of the subject.

Engaging experienced teachers in the creation of educational games is recommended, as they have experience in working with the age group of students in a subject. Teachers are used to present the matter of study to the students in an appropriate and understandable way. Moreover, they know about the topics which are struggling for students and would emphasize on them. Experienced teachers would present a subject matter in an appropriate form (text, graphics, sound, etc.) and would require adequately feedback from students. The proper evaluation of the knowledge demonstrated by players is important for their motivation for the educational game. Thus, they would play with passion and have an incentive to get ready in advance by learning the matter inserted in the game.

The involvement of teachers in creating entertaining educational products will positively affect their attitudes towards the use of educational games in teaching practice.

Besides teachers, students can also be included in the process of creating educational games. This would be an additional motivation to study a learning matter and search for additional information that

is interesting, but is not included in the mandatory learning matter. An additional advantage of including students in the process of creating educational games and other forms of fun learning products is that topics and problems relevant to the respective age group may be embraced.

In view of annual curriculum updates, it would be appropriate for educational games to be updated simultaneously. This is a periodic labour-intensive process that has to be done every year, and for minor changes in the curriculum – once in a few years. The regular inclusion of new learning matter is recommended, and the matter that is removed from the curriculum may remain as an additional module, which students can use if they wish.

3.3 Providing the technical equipment

In most of the schools in Bulgaria, the necessary technical means for the use of learning games and other electronic teaching materials are not available. There is a computer lab in every school, but most of the equipment was purchased several years ago and is outdated and obsolete. Another problem is the access of students to available equipment out of the classes in Information Technology and Informatics, especially in small settlements. In some schools, these cabinets are locked and students do not have access to them, and others use the equipment for activities not related to the school (playing commercial games without learning content, web browsing and videos inappropriate for their age).

It would be a solution to equip school libraries with a sufficient number of computers for educational games, other learning resources and the Internet, depending on the number of the students in the school. In this case, training of librarians able to effectively help students use appropriate learning products is recommended. Programs for parental control can be used to protect adolescents from inappropriate websites and applications.

The purchase of technical equipment can be made with funds provided by the institution responsible for education in Bulgaria (MES), by the school (applying for projects under a call for proposals) or by donations of companies periodically replacing their computers. In recent years, many school principals started to submit proposals for funding the needs of the school entrusted to them. Unfortunately, the technical means for the learning process are not the only direction in which the financial resources of the school are lacking. Most of the schools need funds to repair the building, cabinets' equipment and heating for winter. A good practice is the regular application for financing various needs such as infrastructure improvements and updates of learning materials, equipment and supplies. Extremely important is the state policy in support of schools.

3.4 Time for preparing the lessons

The new technologies and teaching methods require longer time for teachers' preparation for the classes. Unfortunately, the time to prepare lessons is not recognized as working time for teachers in Bulgaria and therefore is not paid. Additional free time should be provided for teachers to prepare the materials, acquire additional qualification and information about new teaching methods and new technologies. This would improve the quality of teaching and hence the effectiveness of school education.

4 IMPLEMENTATION OF GAME-BASED LEARNING

Game-based learning is particularly suitable for students from an early age – preschool and elementary school age. The concept of edutainment (education through entertainment) is widely discussed in the field of education and information technologies. This means that games are not only an adjunct to learning process, but also a major part of it. When using GBL, students receive and consolidate a subject knowledge from a game in a fun way.

This type of teaching also started spreading in Bulgaria, albeit slowly. It is used mainly in language learning and mathematics education in private schools in the form of courses that are not accessible to all families and in every part of the country.

This form of training should be offered in public schools so as to be accessible to all students, and this can be made through the implementation of the recommendations in section 3 for introducing educational games in Bulgarian schools.

Some examples of good practices in different countries in applying educational games in various subjects are mentioned further.

An online game-based platform for teaching and learning English has been created for Danish primary schools [11]. The game for computer-assisted language learning is called Mingoville. This game is a web-based learning environment that capitalises on mini-games and other entertainment activities that engage children in their spare time outside school. It refers to school activities such as reading, listening and spelling. The game contains missions that aim at vocabulary training, spelling and word recognition, etc.

An online game has been applied to the history education in Korea [12] and used extensively. The lack of creativity in history teaching had caused students to become bored and lose interest in the subject. The game session usually takes place synchronously, a group of students comes together in a classroom. The authors of [12] believed that history educational games can be used as an alternative to foster history learning in an entertaining experience.

weMakeWords [13] is an adaptive learning game for literacy acquisition, created in the Technical University of Munich, Germany. It enforces collaborative actions between players where children aged between 4 and 8 are constructing words for a limited time. The concept of the game is based on combining characters to make up words. Children work together by sending each other characters they do not need for their own word combination. All playing children should have to work together and help each other to be able to reach the game's goal. The authors stated that students are often motivated to learn tedious matter when it is required for successful game play. The result of playing the game has been a huge amount of words that children could remember after playing.

A game called "The Map" (Fig. 8) [14] is developed for helping the Bulgarian students with preparing their lessons for school. The selected thematic area for the prototype of the game is "Geography". The selected initial target group is the age of 11-12 years-old or fifth grade. The players have to answer to different questions and they receive additional information, connected to the question topic. The game does not provide a direct interaction between the players, but they compete with each other with their best final results of a subject and age group. The experimental results show that there is a significant increase in the success of the class students that used the system compared to the previous year, who did not play the game.

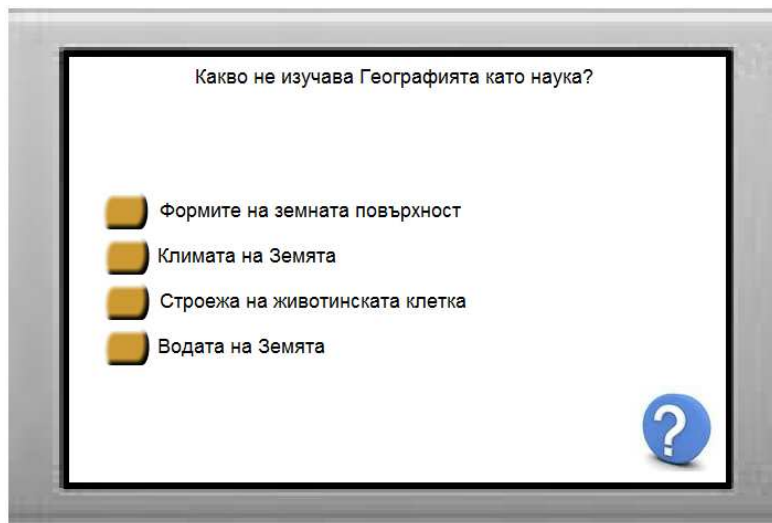


Fig. 8 Bulgarian educational game for Geography

5 CONCLUSIONS

The conducted survey revealed two main aspects of teachers' attitude to the use of educational games in teaching process. On one hand, a significant part of Bulgarian teachers do not understand the concept of educational games. On the other hand, the teachers who answered the questions related to games are predominantly those who understand this concept and in the survey enounced strongly positive attitude to these concept.

For a wider expansion of educational games in Bulgarian schools, it is necessary to perform targeted actions. According to the teachers, the main obstacles to the wide usage of educational ICT and game

products are the following: the lack of training and attitude with teachers, the lack of appropriate products and the lack of technical resources in schools' classrooms. A short analysis is made on these obstacles and some recommendations were derived about eliminating or decreasing their influence.

In addition, the implementation of game-based learning in Bulgaria and other countries is briefly described. The use of educational games gains popularity as a training method in many places, but it is still not that popular in Bulgaria. Various games for facilitating the learning of various school subjects are created and included in teaching practices in and out of class. The authors of this paper have also created and included an educational game in their own teaching practice.

We hope that the analysis and conclusions made in this paper can be useful for teachers and educational authorities to understand the need of ICT-based games that are effective not only for entertainment but also as a teaching tool.

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