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"MATHEMATICS, INFORMATICS AND PHYSICS"

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The new 10-th volume of book 5 Mathematics, Informatics and Physics includes papers in Mathematics, Informatics and Information Technologies, Physics and materials from the Scientific Conference 'Information Technologies in Education' (ITE), held at the University of Ruse in November 2012 in the frame of Project 2012-FNSE-02.

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USE OF COMPUTER GAMES AS AN EDUCATIONAL TOOL

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Abstract: This paper is related to a research developed in collaboration by three higher education institutions – University of Ruse, New Bulgarian University and South-West University "Neofit Rilski". The research is supported by National fund: Bulgarian science fund, project ДФНИ-И01/10. The major objective of the project is to research innovative methods for assessing competence in e-learning environments. The specific article presents an overview of using computer games as an educational tool for providing the development of cognitive skills and making possible the socio cultural interactions. It defines games as an instructional medium for experiential learning, team building and easier understanding of abstract concepts.

Keywords: e-learning, computer games, teaching, learning.

INTRODUCTION

Constantly emerging new technologies challenge the field of education. Proper use of contemporary educational technologies can enhance learning and teaching. However, to be helpful, this technologies need to be incorporated in advanced pedagogical methods, which on the other hand stimulate collaboration, communication and mobility.

Dramatic changes in information and communication technologies (ICT) provide a powerful strength for the growth of e-learning. E-learning has become the certain trend for education with the educational technologies like:

➢ Smartphones and mobile computers.
➢ Networking software (Facebook, Twitter, Skype).
➢ Learning applications and open educational resources.
➢ Tools for personal learning environments - collaborative tools (blogs, wikis, authoring software).
➢ Virtual reality and immersive environments (virtual worlds).
➢ Media production and distribution tools.

According to Moore & Anderson using computers and accessing the Web in universities, using quality e-learning resources, broadband connections and Web 2.0 networking applications, provide conditions for increasing student autonomy and learning effectiveness [8].

In an e-learning environment the role of the teacher has shifted from content provider to facilitator of students' learning. The teacher plays a key role in e-learning environment. Their mission is to track learner's progress during the course and provide him with support. They should help and encourage the learners, track their progress, guide them, answer their questions, and so on. Ertmer [2] argued that teacher's pedagogical beliefs about the value and role of technology will determine students' attitudes towards using technology [2].

1. COMPUTER GAME - DEFINITION

Computer games are a new challenge to the teaching community, providing the development of cognitive skills and making possible the socio cultural interactions [6]. It is an instructional medium offering strong degrees of cognitive efficiencies for experiential learning, team building and easier understanding of abstract concepts. The following definitions of games are provided by different researchers:

➢ Gredler defined educational games as unique opportunities for students to experience activities within a cognitive domain in which new knowledge can be introduced [5].

➢ Computer game is a game to be played using technological devices throughout human - computer interaction [9, 4].

➢ According to Zimmerman the game is a fictional interactive activity without obligations, with rules, a defined time and space and quantifiable outcomes. The game play is the free space of movement within a rigid structure [10].

➢ Another term used by researchers is Serious Games. A serious game is a game designed for a primary purpose other than pure entertainment. The "serious" adjective is generally pretended to refer to products used by industries like defense, education, scientific exploration, health care, emergency management, city planning, engineering, religion, and politics [11].

2. USING COMPUTER GAMES AS AN EDUCATIONAL TOOL – STRENGTHS AND WEAKNESSES

The interest in using computer games for educational purposes has also increased over the last decade, with researchers identifying key pedagogical features that make good computer games inherently strong learning tools. A well designed game can teach higher order thinking skills such as strategic thinking, interpretative analysis, problem solving, plan formulation and execution and adaptation to rapid change [12]. These are the skills employers increasingly seek in workers and new workforce entrants. Games can also serve as powerful tools for teaching practical and technical skills. In addition, today's students who have grown up with the new ICT are especially ready to take advantage of the educational games.

The following *benefits* of gaming have been recognized by the Federation of American Scientists, the Entertainment Software Association and the National Science Foundation convened a National Summit on Educational Games [3]:

Higher Order Skills:
➢ Think strategically about their positioning, analyze opponent strengths and weaknesses, plan how to achieve game goals and execute those plans.
➢ Master resource management - managing people, money, food and natural resources - and learn to acquire and apply force multipliers such as knowledge and technology.
➢ Interact with systems and understand the interaction of variables.
➢ Multi-task, manage complexity, respond to rapidly changing scenarios and make decisions.
➢ Learn compromise and trade-off in satisfying the needs of diverse constituencies.
➢ Manage complex relationships.
➢ Exercise leadership, team building, negotiation and collaboration.

Experiential Learning
The Experiential Learning promotes active learning, including planning, reflection and acquire theoretical knowledge in the following manner:
➢ Learning takes place as part of a sequence of steps where a learner starts by actively taking part in an educational process that provides a concrete experience.
➢ Personal reflection on the experience.
➢ This reflection is then followed by the application of known theories to the experience or the derivation of rules from it.

➢ Learning is used to inform, modify and plan the next learning activity.

Practical Skills Training:
Through games and simulations learners can exercise practical skills. This allows learners to train and practice without risking life or breaking up expensive equipment in the classroom. The learners can try again and again to acquire the required knowledge and skills.

High Performance Situations:
Games and simulations show promise in training individuals for high-performance situations that require complex and multicomponent decision-making. Characteristics of such situations include: rapidly evolving; ambiguous scenarios; time and performance pressures; the need for judgment and high consequence for errors.

Rarely Used Skills:
Simulations are particularly important for reinforcing skills that are seldom used. For example: to practice students' responses to natural disaster situations.

Developing Expertise:
Games offer a way to learn how experts cope with the problems, creating mental models or templates that they apply to different situations in their work. Games and simulations provide an opportunity to develop mental models more quickly to augment real-world experiences.

Collaborative Learning and Team Building:
Games offer opportunities to information sharing, goal-directed cooperation and the spontaneous formation of relations - all critical skills demanded from the today's employers.
Educational computer games:
➢ Develop skills for effective work team, especially in decision-making, exercising judgment and solving problems under pressure.
➢ Offer opportunities for teams to develop shared knowledge and shared mental models that support implicit communications.
➢ Help teams improve communications among members by allowing them to develop information flows and practice task sequencing.
➢ Provide feedback - one of the benefits of computer games is the ability to provide the interaction and feedback that is crucial to the experiential learning cycle and to the whole learning process.

Problem-Based Learning
Problem-based learning involves small groups of students working together on real-life and cross-disciplinary problems. The teacher is facilitator rather than subject expert. Resources are provided to the students but information on how to cope with the problem is not provided. This encourages students taking more responsibility for their own learning and learning in a real-world context [1].

Disadvantages of using computer games in education
Despite all the benefits that learning with computer games provides, there are some disadvantages. For instance [7]:
➢ High development costs.

> ➢ Slow change in educational institutions for adopting new innovations and new learning technologies.
> ➢ Some teachers have very negative attitudes about giving up textbooks in order to use educational gaming products.
> ➢ The specific educational values that are related to educational standards have not been proven.
> ➢ Games are especially good at teaching skills, which are not typically evaluated in traditional assessments.
> ➢ Lack of access to required technologies.

CONCLUSION

The aim of this article was to present a short overview about the educational value of computer games in learning context. It states that using computer games as an education tool contributes to development of the human society and facilitating ways of social interaction. It is one of the most common forms of entertainment. The value of computer games lies in the opportunity to combine the play with pedagogical advantages and to promote changes in cognitive, behavioral and psychomotor skills.

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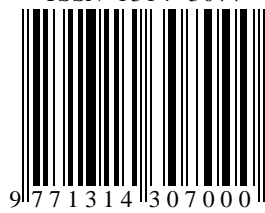
ИЗПОЛЗВАНЕ НА КОМПЮТЪРНИ ИГРИ КАТО СРЕДСТВО ЗА ОБУЧЕНИЕ

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Русенски университет "Ангел Кънчев"

Абстракт: Тази статия е свързана с изследване, проведено в сътрудничество с три висши учебни заведения – Русенски университет Ангел Кънчев, Нов Български Университет и Югозападен университет Неофит Рилски. Изследването е подпомогнато от Национален фонд Научни изследвания, проект ДФНИ-И01/10. Основната цел на проекта е изследване на иновационни методи за оценка на компетенции в среди за електронно обучение. Конкретната статия представя въведение в използването на компютърните игри като средство за обучение.
Ключови думи: електронно обучение, компютърни игри, преподаване, учене