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## THE ROLE OF COMPUTER GAMES IN FORMAL AND INFORMAL EDUCATION

**ABSTRACT:** Computer games are an important component of the industrialised and computerised world; at the same time they are a significant element of children and adolescents' lives. Nowadays, the computer enables people to create a new space in which players can engage in journeys full of adventures and action. However, the computer can be used as a didactic aid aimed at advancing and consolidating the knowledge that young people acquire. Teachers perceive computer games only as a source of entertainment and do not allow them to fulfil an important role in the process of education. However, the use of the potential of the most popular entertainment among students can make learning an adventure, just like their favourite computer game.

**KEY WORDS:** *computer games, education, entertainment*

### Introduction

Computer games, which may be described as the phenomenon of the 20<sup>th</sup> century, are a consequence of media expansion. These are special computer programs which perform entertaining functions by the possibility of manipulating electronically generated objects according to the rules set by computer games designers<sup>1</sup>. As

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<sup>1</sup> M. Łukasz, *Magia gier wirtualnych*, Warszawa 1998, p. 11.

a form of entertainment, computer games appeared in the 1980s and have become more popular than books, TV and playground.

The world of computer games currently seems to be an indispensable space assigned to modern childhood, where young people have found unlimited possibilities of self-expression. When playing computer games, children have a chance to not only participate in many fantastic adventures, but also create such adventures themselves. Young players change *from passive recipients to active participants*. For young people computer games are a kind of an artificial paradise as well as an opportunity to free their personal tensions and desires. In order to understand the phenomenon of computer games we need to understand the rules of their functioning. The interactive nature of a computer game is one of its most important features. Due to the interactivity the player has a certain degree of freedom in his or her actions, which has an influence on the course of action. The computer may be then treated as a kind of a partner that never gets tired or says no<sup>2</sup>.

In a computer game the player is no longer a spectator but becomes an interested participant of the events, genuinely involved in playing the role. Perhaps this special kind of perception, which is the ability to interact, brings so many fans to computer games and increases their popularity. Computer games have become a very important element of contemporary culture. They fill up the space between fantasy and learning, advanced technology and primitivism, amusement and life. For young people, a computer game is an entertaining activity which is full of colours, sounds, actions and emotions.

In the literature on the subject we can find an opinion that computer games have a positive influence, as they provide children with access to the latest technological developments and make it possible to acquire skills related to using this kind of hardware, which may be useful in the future<sup>3</sup>.

Computer games, by their nature, stimulate the player's curiosity and make him or her use independent efforts without any external pressure. The fact that computer games trigger the player's internal motivation to repeat tasks, get better results and move to next game levels, makes adapting new information and skills acquisition easier. Getting and using the required information and specific skills is essential to succeed in a game<sup>4</sup>.

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<sup>2</sup> J. Boroń, T. Zyss, *Kultura „techno” – wyzwaniem i zagrożeniem dla współczesnego świata*. „Psychoterapia” 1996, No. 1(96), p. 41.

<sup>3</sup> M. Griffiths, *Czy gry komputerowe szkodzą dzieciom?* „Nowiny Psychologiczne” 1995, No. 4, p. 38.

<sup>4</sup> M. Łukasz, *Magia gier wirtualnych...* pp. 62–65.

Computer games also allow the players to satisfy their emotional needs and experience feelings such as power, strength, fame and happiness. Self-esteem is strengthened by winning, while failures are presented in such a way that they do not hurt the feelings and give a chance to improve. All this can increase a feeling of success and agency, reduce anxiety and stimulate imagination<sup>5</sup>.

There are many multimedia games on the market created for educational purposes, mainly to learn languages and school subjects. It is also possible to find interesting puzzle and strategy games, which support the mental development of children and adolescents and teach the critical exploration as well as the construction of meanings and concepts; they also help to practise imagination and facilitate active involvement in the learning process<sup>6</sup>. However, most computer games available on the market are not intended for didactic purposes. In literature, they are recognised as commercial games, designed by profit-driven computer companies for entertainment purposes<sup>7</sup>.

### Computer Game as an Entertaining Medium

Computer games have dominated mostly a sphere of entertainment and leisure activities. They exert a prominent impact on creating new trends and cultural phenomena; they are often a kind of panacea for problems at home and school<sup>8</sup>. Multimedia games begin to fulfil basic social functions and replace natural contact with peers, since the user usually plays games alone. Consequently, an indirect communication starts to rule the everyday life of children and adolescents, who permanently spend their leisure time on playing computer games instead of doing outdoor activities. As a result, some essential changes occur in the pool of their free time. This leads to computer games increasingly influencing the ways children and

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<sup>5</sup> M. Braun-Gałkowska, *Gry komputerowe a psychika dziecka*. „Edukacja i Dialog” 1997, No. 9(92), p. 58.

<sup>6</sup> J. Laszkowska, *Oddziaływanie gier komputerowych na młodzież*, „Problemy Opiekuńczo-Wychowawcze”, 1994, No. 4, p. 11.

<sup>7</sup> M. Kołacz, *Gry komercyjne – gry dydaktyczne. Jak tworzyć gry, żeby uczeń chętnie z nich korzystał?*, „Komputer w Szkole” 2001, No. 3/4, p. 94.

<sup>8</sup> M. Griffiths, *Czy gry komputerowe szkodzą dzieciom?* „Nowiny Psychologiczne” 1995, No. 4; J. Boroń, T. Zyss, *Świat gier komputerowych II – badania ankietowe nad ich rozpowszechnianiem wśród młodzieży szkół średnich*, „Psychiatria Polska” 1996, 2(30); M. Braun-Gałkowska, I. Ulfik, *Zabawa w zabijanie. Oddziaływanie przemocy prezentowanej w mediach na psychikę dzieci*, Warszawa 2000; M. Sokołowski, *Wpływ gier i programów komputerowych na dzieci*. In *Media a Edukacja*, ed. W. Strykowski, Poznań 2000.

adolescents act. Such values and attitudes are often antisocial – young people adopt them from computer games and share them among their peers. What is more, there has even been observed an alarming syndrome among children and adolescents, of filling their free time exactly by this type of play<sup>9</sup>. Computer games have become an egalitarian form of entertainment, especially among younger generation, thus, they compete with other free time activities, which in fact are more beneficial for the comprehensive development of young people.

The entertaining nature is a basic feature of computer games, which makes them so popular. Yet, entertainment may be interpreted in many ways: it can be treated as an escape from the reality, diverting attention from problems, relaxation, internal cultural or aesthetic satisfaction, or even sexual stimulation<sup>10</sup>.

Computer games give the players a possibility of active reception of the entertaining content without participation of other people. They replace the other person and substitute the social life. If one wants to play chess, the opponent will be replaced by a computer. If one looks for adventures, he or she will find the world replacing the reality. Everything can be substituted in computer games: the other person, the world, experience, emotions, problems, situations and events. The players are the ones who decide what should be replaced and to what extent. A player activates a computer game and gives a specific quality to it.

### **Educational Benefits of Computer Games**

A game is a form of play with players having to respect fixed rules. By accustoming to the observance of these rules a game has important educational functions; it teaches the respect for accepted standards, cooperation, winning and losing and also promotes socialisation. There are different types of games: educational ones, which require mental effort, sport games based on physical activity and field games, which need special training<sup>11</sup>.

Educational games are the most instructive; they belong to the group of problem based learning methods, described as a type of training where the educational content is organised into models of real phenomena, situations or processes aimed at approximating students' cognitive process to direct cognition by providing the

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<sup>9</sup> M. Wawrzak-Chodaczek, *Komputer jako nowe medium kultury domowej*. In *Kształcenie kultury audiowizualnej młodzieży*, Wrocław 2000, p. 176.

<sup>10</sup> M. Łukasz, *Magia gier wirtualnych...*, p. 33.

<sup>11</sup> W. Okoń, *Słownik pedagogiczny*, Warszawa 1987, p. 89.

chance to manipulate the model<sup>12</sup>. The phases of an educational game are as follows:

- provide a preliminary experience,
- use the preliminary experience, i.e. update the knowledge, verify the preliminary knowledge and process it for the purposes of present actions.
- produce a new experience,
- use the new experience<sup>13</sup>.

Currently on the market there are more and more educational games. The idea of this kind of games involves passing a starting point and following a sequence of moves. Deciding and choosing the way of player's actions are, therefore, elements of this type of game. A player very often has to create a project, which is a solution chosen from many variants. Although players frequently decide under the influence of their emotions, it still prepares them to make life decisions<sup>14</sup>.

The functions of computer games, which allow them to be used in education, are as follows:

- motivate players due to the attractive psychological education background. It is very significant and useful when working with young students who emotionally identify themselves more with a game than education.
- imitate real situations. Computer games can imitate the experience and thus give an opportunity to work on practical skills, even if creating such situation in real life would involve some risk (e.g. in the case of strategy games and flight simulators).
- facilitate the operationalisation of certain theoretical structures by means of intuitive strategy measures derived from games<sup>15</sup>.

For a computer game to be educational it must feature the following functions assigned to educational programs:

- substantive function – regarding accuracy, reliability and linguistic correctness of the content,
- methodological function – related to graphics, font colour, quality of drawings, maps, animations (everything that determines the attractiveness of the game)

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<sup>12</sup> K. Kruszewski, *Sztuka nauczania. Czynności nauczyciela*, Warszawa 1995, p.15.

<sup>13</sup> W. Pomykała (ed.), *Encyklopedia pedagogiczna*, Warszawa 1993, p. 223.

<sup>14</sup> B. Siemieniecki, *Komputer w edukacji. Podstawowe problemy technologii informacyjnej*, Toruń 1997, p. 77.

<sup>15</sup> M. Bołtruć, P. Bołtruć, *Inne spojrzenie na nauczanie w oparciu o gry*, „E-mentor” 2004, No. 2(4). <http://www.e-mentor.edu.pl/artukul/index/numer/4/id/43>. [accessed: 15.03.2014].

- psychological function – the influence of a game on students' interests, enabling them to customise their pace of work<sup>16</sup>.

A computer offers many opportunities; it may be used not only as a didactic method, but also as an advanced educational tool. Educational tools are objects that provide students with specific impulses and facilitate direct and indirect exploration of the reality so as to improve the teaching and learning process<sup>17</sup>. They should fulfil a cognitive function as well as replace and support the thinking process. Computer games meet the above objectives. By simulating a definite reality, they allow the players to acquaint themselves with a specific phenomenon or process; they can replace teacher's educational activities and help to compare the elements of physical and electronic reality being explored.

### Use of Computer Games in Formal and Informal Education in the Light of Personal Research

Considering the complex problem scope of computer games, the following text examines this issue to a limited extent, i.e. it addresses the use of computer games in formal and informal education. In order to collect empirical material, in March 2014 a survey was conducted among children and adolescents as well as teachers from the Silesian Voivodship. The study involved 156 students from primary and secondary schools and 43 teachers.

**Table 1.** Overview of students taking part in the survey

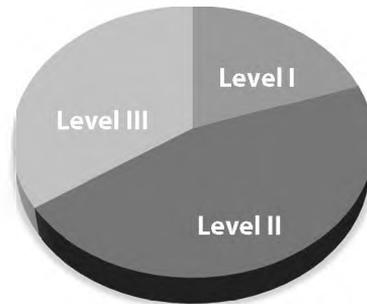
Educational Level	Sex				TOTAL	
	girls		Boys		f	%
	f	%	f	%		
Level I (grades 1–3)	6	7.70%	13	16.66%	19	12.18%
Level II (grades 4–6)	43	55.12%	45	57.69%	88	56.41%
Level III (lower secondary school)	29	37.18%	20	25.65%	49	31.41%
TOTAL	78	100%	78	100%	156	100%

<sup>16</sup> T. Huk, *Komputer w kształtowaniu umiejętności kluczowych*, Warszawa 2008, p. 109.

<sup>17</sup> Cz. Kupisiewicz, *Dydaktyka ogólna*, Warszawa 2000, p. 177.

A computer game is an undoubtedly attractive educational tool. It was therefore necessary to determine how often students play computer games while studying. As it turns out, educational computer games are not a popular teaching aid, as only 30% of the students declare that they use computer games regularly for studying. Moreover, this type of broadening and consolidating knowledge is used mostly by Level II students (48.86%), who play games and do exercises on CDs attached to textbooks. This is a typical way of learning IT, history and foreign languages. Taking into account the fact that computer games allow children to learn while having fun, it is surprising that only 21% of students from grades 1–3 use it for educational purposes. Younger children should be encouraged to use a computer (which is very attractive to them) in many multimedia games; it very often resembles a computer game and provides a recipient with the required educational information. The potential of computer games can fulfil a prominent role among young people. It also provides them with interesting and important information, as computer games indirectly contribute to broadening the conceptual scope and better understanding of many terms and science laws through their graphic illustrations.

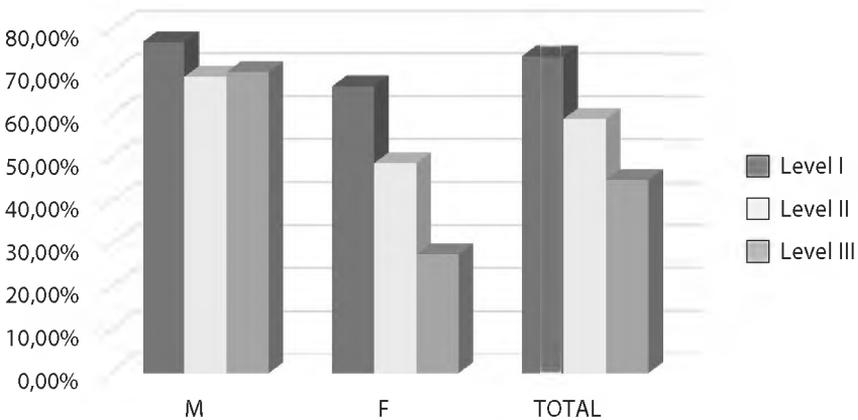
**Fig. 1.** Use of educational computer games in formal education by students of particular educational levels



Computer games treated as an entertainment medium are far more popular among children and adolescents. The youngest respondents are the most active in this respect; 70% of 1–3 grade students admitted to use them regularly. Sport or Lego games are the most popular choices. However, in this age group there are users playing games with undesirable content, e.g. GTA, where violence and destruction are the main driving force of the protagonist's actions. What gives a cause for concern is the fact that playing computer games with violent elements may influence the development of conduct disorders in the form of visible antisocial and aggressive behaviour. On the basis of the survey results, it can be observed that

the interest in computer games as a form of entertainment decreases with age. In senior grades of primary school 59.09% of the students declare to play games of this type, while among lower secondary school students this number decreases to 44.9%. The fact that more boys than girls play computer games among all age groups is another issue worthy of note.

**Fig. 2.** Use of educational computer games in informal education by students of particular educational levels

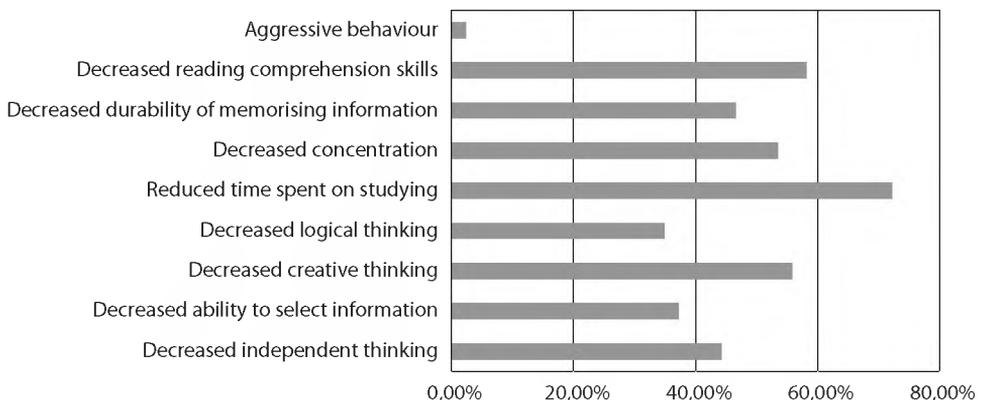


Computer games are, therefore, still an attractive educational and entertainment medium, so it is worth using their potential in education. When conducting classes, teachers often make use of various teaching aids aimed at advancing the acquisition of knowledge. Selection of these measures changes depending on the types of classes. Multimedia programs can therefore be an interesting teaching aid. However, according to the research, teachers occasionally take advantage of computer games during class. This is due to the fact that in order to use a computer game effectively, two aspects must be considered. The first concerns the equipment in place; the second one refers to students' capabilities. The lack of computers in classrooms (apart from the computer lab) can be mentioned as the first obstacle; the other is connected with the domination of more active students in performing their tasks, which leads to losing control over the work of some of the students. The study suggests that the teachers are aware of advantages of computer games, particularly in the performance of tasks such as organisation of free time (41.86%), practising specified skills (32.56%) or skills which cannot be

practised at school due to the lack of time (25.58%) and discovering interests of the students (23.26%).

Nevertheless, the solution to these problems appears to be achievable. First of all, a computer game should be played not at school but rather outside the classroom, as a part of individual work. It should be treated as a special didactic project implemented in order to obtain a mark. It can also be given as additional homework. Implementation of this project may allow a teacher to stimulate students to study and show them a more attractive and dynamic character of the subject. On one hand, presentation of the educational material will be more interesting and accessible; students will acquire a particular scope of information in a funny form. On the other hand, it will draw attention to the fact that computer games, provided that they are properly chosen, may be a source of knowledge and inspiration to broaden one's mind. In addition, implementation of a project connected with a computer game at home will exclude organisational and logistical problems, which may be related to the fact that schools are maladjusted to conduct computer classes (one computer lab, lack of appropriate software, etc.). A project involving the use of a computer game should be executed in small groups of two or three students, so that students with better computer skills could help their less skilled mates. Students who lack computer skills can compensate for it by their intellectual input. At the same time, working in groups would initiate integration of students and activate a system of internal control, so that several people would supervise a proper performance of the task.

**Fig. 3.** Negative consequences of overusing computer games in teachers' opinion



Nevertheless, there is no doubt that computer games are generally only a source of fun and entertainment for children; this is how teachers perceive them. Computer games are not always regarded as a tool used for educational purposes. Teachers emphasise also the fact that computer games are mainly an entertaining form of spending leisure time by students. For this reason they see numerous negative consequences of overusing multimedia programs.

Reduced time for studying (72.09%), decreased reading comprehension skills (58.14%), decreased creative thinking (55.81%) and decreased durability of memorising information (46.51%) may be mentioned among them.

## Conclusion

Schools cannot avoid multimedia programs. Nowadays, we live in a world where the media and educational space intertwine. The virtual world gives us a chance for using its potential to present numerous life aspects. This is also a great chance for education. Unlimited opportunities give rise to a digital space in various subjects. Such space does not have to take a form of a single or conventional scheme. The great variety of computer games, their kinds and the related contrasts in the way of moving and presenting the world, gives us a chance for creative and unconventional application of computer games in the educational process. It is the teacher's imagination which is a single determinant that sets the limits of using a computer game. If the opportunities of the virtual world are used in an appropriate way, children, while performing a fascinating task, will find what is the most important – the knowledge.

Both educational and commercial games are aimed at young recipients, so that it is extremely important to design educational computer games of a quality that resembles the commercial ones. It is the main task for a designer of educational games to provide the students with an opportunity of having fun; the didactic content should be incorporated in such a way so as to form an integral part of it. A student should gain the knowledge while playing without the awareness of being in the middle of the teaching process.

Compared to the virtual world in which students act, the school does not seem to be very attractive or interesting. Its unreal nature stands in opposition to the changing space of social life and instead of strengthening the pace, the school makes it slow down<sup>18</sup>.

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<sup>18</sup> W. Kołodziejczyk, *Projekt e-Akademia Przyszłości odpowiedzi na wyzwania dzisiejszej edukacji*, „Edukacja i Dialog” 2012, No. 9–10, p. 48.

Computer games and education are not opposed to each other, therefore, they should not compete, but they should be mutually supportive. Contemporary science introduces IT based modern methods and teaching aids. Computer games dominated the digital world a long time ago and they function very well in it. Teachers should not keep away from virtual games but competently use them in the educational process. This kind of combination of science and entertainment may be a panacea for the problems of today's school.

The role of a teacher is changing in the world determined by technological developments. A teacher enters another dimension of work and requirements, which are often far from the experience in his or her education. As a result, many new problems appear; the teacher has to find a solution to them in order to meet expectations placed upon him or her. The main task of the modern school is to equip students with tools facilitating lifetime learning. An educator should also support the development of skills required in the information society.

The current number of computer games, which would effectively combine education and entertainment with a high level of satisfaction and educational value, is relatively small. Producers of computer games often face a problem of finding a balance between the degree of entertainment and a level of the educational value. Keeping both these elements together at a high level is extremely difficult. Usually, producers need to decide which element will dominate, so the resulting combinations are often rather extreme; in computer games with high playability, satisfaction and positive experience of a player, the educational value is only an addition and a supplement of game rules. By contrast, when producers care about the content and sharing solid knowledge, these products are no longer called games, but rather simulators or educational programs, which often discourages potential users to check out such games.

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