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Determinants of the Use of Computer Games in the Teaching Process

Uwarunkowania wykorzystania gier komputerowych w procesie nauczania

Keywords: computer games; e-gamers; e-gamers' behaviour; didactic process

Słowa kluczowe: gry komputerowe; e-gracze; zachowania e-graczy; proces dydaktyczny

JEL code: I2; M15; O39

Introduction

The main goal of the following article is to analyse the behaviour of e-gamers and their opinion regarding possibility to use existing games in didactic process at high school. To determine the profile of discussed high school, the research was limited to subjects provided at Management Faculties. The respondents of the research represent students of the Faculty of Management (University of Warsaw).

According to the statistics of Newzoo [2016a], in 2013, the number of gamers in Poland amounted to 13.4 million. 98% players used their PCs to play computer games (together with other platforms). Poland takes the second position in Europe among the examined countries. The market of computer games is rapidly growing every year – at the end of 2014 in Poland it was estimated at about 280 million dollars and it will be growing by 3.8% a year, thus, increasing the value of the entire market over 430 million dollars as expected at the end of 2016 [PB.pl 2016; Newzoo 2016b]. Hence, undoubtedly, the subject matter is worthy of attention.

The phenomenon of computer games is elusive from the perspective of a formalized scientific analysis [Chmielarz and Szumski 2016a]. There is no single definition of computer gaming [Chmielarz 2015b; IT-pomoc.pl 2016; wiedzaiedukacja.eu 2016; jestemgraczem.com 2016; Marketing-news.pl 2016; PB.pl 2016; Zając 2014] and taking a narrow approach, computer games are seen as software played on the equipment of a computer, and in a broader one, it also includes consoles or mobile devices.

For this particular purpose it was decided to use the term "computer games" as a generic term (object hypernym) with respect to an entire class of different kinds of games treated as a homogeneous phenomenon [kipa.pl 2016].

Secondly, there is no commonly used definition of a computer game player (e-gamer). And again, in a narrow meaning, an e-gamer is a person that plays solitaire or multiplayer computer games every day or several times a week. Sometimes the statement is limited to persons that play MMO type games or who treat games as a type of sport and play games almost professionally [Chmielarz and Szumski 2016b].

It is observed a more and more common approach to transfer this naming convention to all people that play any type of games, treating games as a sort of one or another type of entertainment. This article also treats e-gamers similarly to the above statement.

Thirdly, there is no single and divided classification of computer games, there are only many different typologies based on different criteria, mostly type of action executed in a game (e.g. logical, strategic, adventure games, RPG), that have many other subtypes.

Although the computer gaming phenomenon was of interest to numerous studies including mass surveys [Żywiczyńska 2014b] and focused surveys [Chmielarz and Szumski 2016c; Chmielarz and Szumski 2017; Mijal and Szumski 2013; Żywiczyńska 2014a], most of those studies were conducted before the most dynamic use of mobile applications implemented on mobile devices and tablets.

The authors focused on identification of major implications related to this new phenomenon that influence the development direction of computer games. This is the reason why the authors decided to do the research, where major target is to analyse such type of computer applications among users. The results presented below constitute a condensed report covering aspects of the third phase of the research executed in October 2016 within a chosen group of students of the Faculty of Management (University of Warsaw).

1. The goal and research methodology

Considering limited and fragmentary research in Polish and foreign literature, related to the use of computer games as well as e-games from the perspective of individual and group customers, the research was based on approach developed by authors of this article [Chmielarz 2015a] consisting of the following phases:

- analysis of the defined group of e-gamers on the basis of qualitative and quantitative survey, divided into three parts: characteristics of a computer player and identification of his/her interest in computer games, specification of possible gaming effects and results for an e-gamer;
- identification of behavioural patterns during and after the game and the opinion on the possibility to extend use of different computer games to support didactic process at the Faculty of Management;
- placement of an online version of a survey on servers of the Faculty of Management, conducting a functionality test and its verification;
- distribution of the survey between respondents, analysis and discussion of the results;
- drawing conclusions from the obtained results concerning the current status and directions for future development of computer games based on user's feedback.

The article presents the results of the survey addressed and analysed in the third part of the questionnaire. The first part allowed defining the profile of a computer gamer at the university and his/her preferences for particular types of games. The second part of the survey allowed to identify effects and results of participation in computer games by an e-gamer. It leads to the third part that is dedicated to psychological predispositions of e-gamers and usability of existing games in the didactic process at the university.

The survey was executed at the beginning of November 2016. Identification of the respondent group was not accidental, and it belongs to the convenience sampling, where respondents were mainly students of full-time and part-time BA, BSc and MA studies at the Faculty of Management (University of Warsaw). The questionnaire was distributed electronically. The participants submitted over 90% of correctly completed questionnaires that proves that students seem to be a group particularly open to any kind of innovation, especially concerning the facilitation of private life and entertainment.

The limitation of the research was an expected number of people who own smartphones, tablets, laptops and mobile phones – not of high quality but with a long duration of use. The survey was completed by 444 people, out of which 401 participants submitted correctly completed questionnaires (which constitutes 92.32 % of the sample). Among the respondents there were 68.08% of women and 31.92% of men. An average age of the respondent was 19.9 years, and the medium value was 19 years. The age is typical of first-year students of BA and BSc studies. Among the survey participants, there were 71.32% of students, 28.68% of working students. 78.80% indicated the secondary level education and 15.71% – post-secondary education, 5.24% – engineering education and 0.25% – full higher education. The survey was primarily conducted among the students of BA studies. Over 32% of survey participants indicated that they are inhabitants of cities with over 500,000 residents, almost 14% came from cities with 100,000–500,000 inhabitants, over 28%

– from towns with 10,000–100,000 residents, over 3% – from towns up to 10,000 residents, and 22.19% declared that they come from rural areas. The simplicity of the survey did not cause many distortions during its completion (43 partially completed questionnaires); and many respondents (over 130) completed also additional sections of the survey.

2. Analysis and discussion of the obtained results

Respondents answered 32 substantive questions. The first part of the questionnaire had introductory character (duration and frequency of game playing, gaming platforms, owned specialized equipment, place and sources of games). The second part was dedicated to behaviour and emotions of e-gamers that accompany them during and after the game. The third part concerns their views regarding usability of different types of games in the didactic process at the university.

Over 72% of participants of the survey play computer games, most of them – almost 48% – started at primary-school age, and almost 15% – at pre-school age. Only less than 10% began playing at later age, with nearly 7% at middle-school age (Polish: *gimnazjum*). It seems to be a very popular activity that starts at a very young age.

Among the computer gamers prevail (almost 33%) those who play occasionally – several times a year. Little more – almost 38% – play every day and several times a week. Over a quarter of the gamers play few times a month, and a small percentage (almost 4%) has not played for a long time.

However, when we refer to results of the survey regarding frequency of game playing, expressed in hours played a week, we might conclude that the above data is somehow underestimated. 41% of participants play less than one hour a week. If we take the standard time for such a game as 20 minutes, it would mean playing more than 13 hours a month, which casts doubt on playing occasionally. Equally large proportions (over 41%) are the players who play an average of 1–6 hours a week. 11% of the respondents declared that they spend more than 7 hours a week playing computer games, and 7% – more than 13 hours a week (therefore, almost compulsively).

Based on the results, the smartphone is seen as a major equipment for gaming (almost 30%), the personal computer and console state for around 20% each, the notebook ranks fourth (15%), the tablet occupies the fifth position – almost 10%. Very seldom respondents use the smartphone, portable console or OS X Platform (Figure 1).

Respondents do not use dedicated equipment during the game (33%). If so, than it is mostly the mouse (22%), special joystick (11%) or standard joystick (9%) or speaker phones with a microphone (almost 10%)

Most of the students (25%) download free games from the Internet, almost the same amount (almost 22%) play network games. Almost 21% buy computer games in computer games shops. Almost 20% borrow from, or exchange them with col-

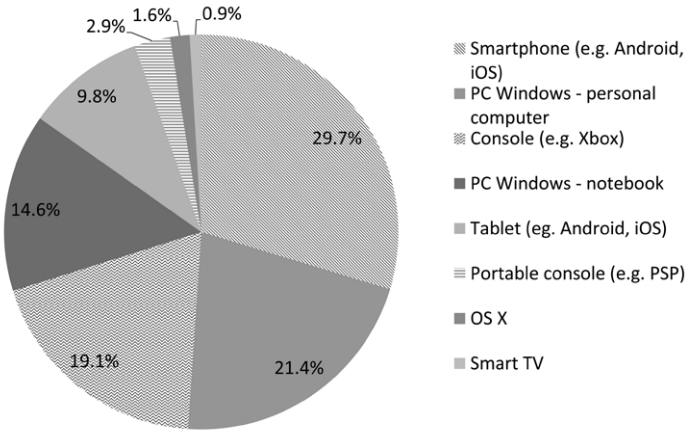

Figure 1. The platforms which were most frequently used as e-games platforms

Source: Authors' own research.

leagues. It seems that purchasing games in game platforms such as Steam gathers more and more popularity – 13% (Figure 2).

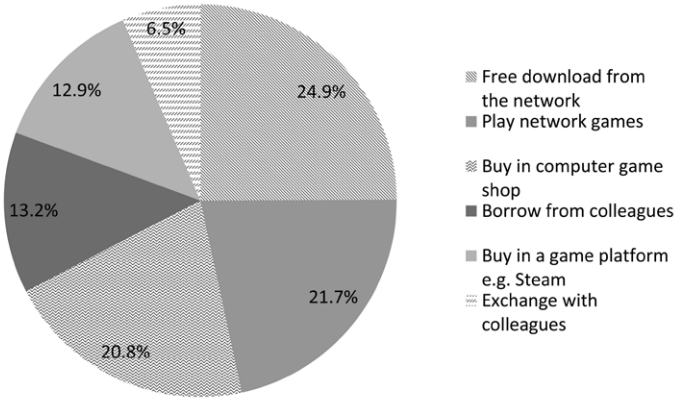

Figure 2. Sources of games

Source: Authors' own research.

An almost identical number of respondents, as in the case of those who download free games from the network, is not interested in paying for games even one PLN (24%). On the other hand, people that might be willing to spend over 100 PLN a month – as per survey – constitute over 16%. 31% of participants declare willingness to spend 1–40 PLN on a computer game; the remaining 29% spend 40–100 PLN a month (Figure 3).

The next phases of the research were related to e-gamers' psychical predispositions and usefulness of those in the didactic process supported by computer games.

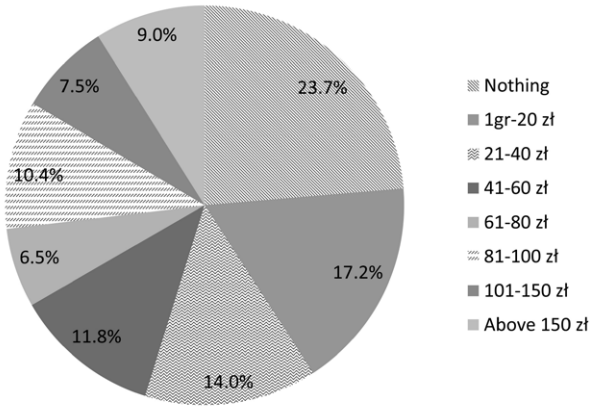

Figure 3. Willingness to spend money on computer games

Source: Authors' own research.

Nevertheless, comforting is the fact that 81.5% of the respondents answered that they prefer social life, and only about 2.5% chose the virtual world of computer games. However, nearly 16% of respondents treat equally a real and virtual life. Nevertheless, whether they like it or not, computer games affect e-players. Firstly, games are addictive in variety of ways. It is indicated by almost 74% of all respondents, and taking into account also the expression "rather yes" – it makes 95% of all participants.

The addiction to game is manifested mostly by uninterrupted gaming for many hours (22%), playing in every life situation (17%) selective deafness – where player is not able to hear what others say to him (16%). Less significant are the following factors: confusion between reality with virtual world (11%) and continuous attempt to reach the next levels of the game (11%) and lack of response to any stimuli (10%). Factors of lesser importance are: moving to another game just after finishing the first one, and increasing the difficulty level of game that the player plays. Among other symptoms of addiction, respondents give also: forgetting about physiological needs, gambit nights, spending money on extra movement in game, breaking up relationship with friends, projection of one's ambitions to virtual life and continuous talking about games (Figure 4).

Another aspect that was investigated are methods that participants use to interrupt e-gamers from addiction to computer games, they mainly use such methods as: trying to get someone's attention (29%), offering an alternative entertainment (24%) appeal to reason (17%). Other options mentioned are sound-related (clapping hands, singing), switching off computer, overturning a chair with an e-gamer.

Respondents asked about feelings that accompany them when their game is interrupted in the first place list: nervousness (37.5%) and failure (16%), whereas 10% feel anger. At the same time, 31% do not feel anything related to the game.

During the game played by e-gamers, different set of emotions accompany the gamer, while lack of emotion is signalised only by 3.37% of participants. The most

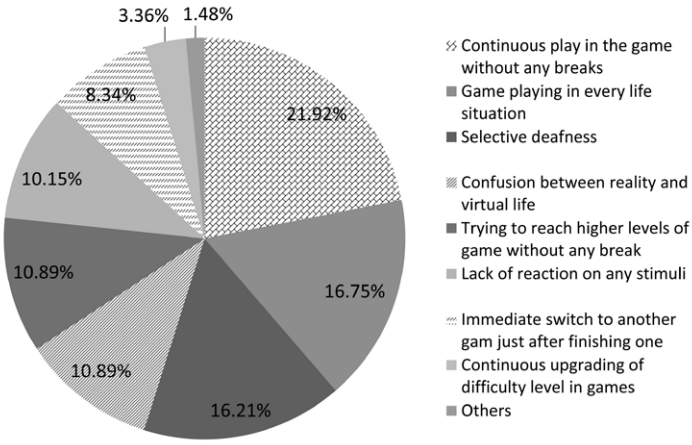

Figure 4. Manifestation of computer game addiction

Source: Chmielarz and Szumski [2017].

dominating emotions are enthusiasm, exultation and satisfaction (almost 75%). Opposite feelings – stress, anger, sadness – state for 21% of answers.

After a winning game, players signalize such behaviour as: scream of enjoyment (33%), dance of victory (almost 20%). Contrary to that, almost 30% say that they do nothing. This indicates perhaps an increasing dichotomy between players playing just for pleasure, and enthusiastic or even professional players, sometimes – as the statistics show – addicted to games. Among other behaviours, after winning the game are mentioned such actions as the analysis of errors, which prevented an e-gamer from winning, praising a friend about winning a game, complaining about producers and errors in the game.

More than 61% of respondents try not to transfer feelings associated with the game to social and family life. And nearly 48% of respondents indicate that they do not neglect their duties, and the answer "probably not" was given by 38%. Only slightly more than 4% admit to abandon responsibility because of games.

Since over 75% of respondents claimed that games are not just used for entertainment, and can be used for other purposes, it was decided to extend the survey questions on the possibility to apply them to education, which in the case of a research sample (students) seemed quite natural. Especially when asking the question – "whether computer games can have educational value?" – the authors received 94% answers of "yes" and "rather yes", where votes against constitute only 6%. For comparison, the sport values of gaming has been mentioned only by 59% of respondents.

To evaluate usefulness of computer games for educational purposes, the authors bring again into play previously used division into different groups of games [Chmielarz and Szumski 2017], namely massively multiplayer online games, adventure games, action-adventure games, RPG, strategic games, survival horror, simulation games, and arcade games (shooting, fighting). On the other hand, there has been made

a standardized set of major subjects provided to students of faculties of economics and/or management, where games can be used for educational processes. Subjects that can benefit from computer gaming, as part of educational process, are: economics, information technology, foreign languages, logistics, marketing, mathematics, negotiations, law, psychology, accounting, sociology, management.

According to provided answers, the following results were gathered [Chmielarz and Szumski 2017]:

- the most frequent answer was indicating possibility to learn foreign languages via playing of the following games: first rank – massively multiplayer online games (32% of all responses), second rank – adventure games (23%), third rank – action-adventure games (19%), fourth rank – arcade games (18%) and RPG (16%);
- the most suitable for management teaching are strategy games (29%) and simulation games (23%);
- the most suitable to support psychology are horror survival games (39%);
- to support educational process of economics – similarly as for management (although in a smaller scope) – are strategic games (13%) and simulation games (12%);
- as research shows also logistics can be supported by games, where the most suitable are strategic (24%) and action adventure games (16%);
- sociology can benefit from simulation games (12%) and adventure games (10%);
- negotiations can be best supported by massive multiplayer online games (12%);
- according to the respondents, in a very low scope, mathematics, information technology, accounting, law and marketing do not seem to be a good target for game support in the educational process (responses ranged between 0–7%);
- the whole research has shown that, according to participants of the research, the most suitable to support didactic process are massively multiplayer online games (31%) and strategic games (23%), whereas the less suitable are games of the RPG type;
- subjects that can benefit the most from use of computer games are foreign languages, psychology, logistics and management.

During the last six months, computer games were most often used by respondents to learn foreign languages (30%), management (15%), economics (9%), and least often – to support learning of accountancy (3%) and law (3%).

Based on the current research, 96% (response "yes" and "rather yes") of students use computer for learning purposes. Computer is used mainly for searching and collecting information (19%), communication (17%), viewing of source materials (17%) and to translate to and from foreign languages (16%). Computer is not treated by participants as a popular tool to solve math tasks and similar (7%) and to create bibliography (9%) (Figure 5).

According to previous surveys [Chmielarz and Szumski 2017], 94% of participants believe that computer gaming improves creative thinking and other positive

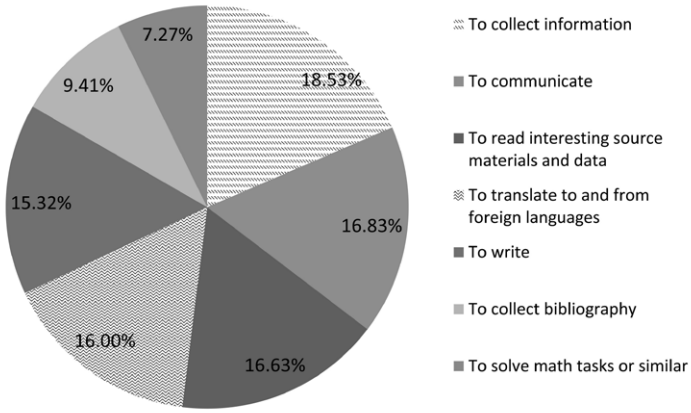

Figure 5. Scientific domains where computer can be used

Source: Chmielarz and Szumski [2017].

features mostly associated with logical thinking (19%), faster reflex and better efficiency in foreign languages (18%). The substantial part of these characteristics are ability to solve problems and issues (13%), better concentration (13%). All together with a better mood (15%), those characteristics might help didactic process as far as the psychological side of learning is concerned. In particular, as further research proves, it is beneficial to learning foreign languages (18%), management (15%), logistics (9%), and psychology (8%). Over 71% of students indicate that computer games can verify information gathered during lectures (Figure 6).

In respondents' view (19%), lecturers should use computer games during their lectures. Over 40% of respondents answered "rather yes" to questions related to possibility of use games during lectures. Only 8% of participants do not see such a need.

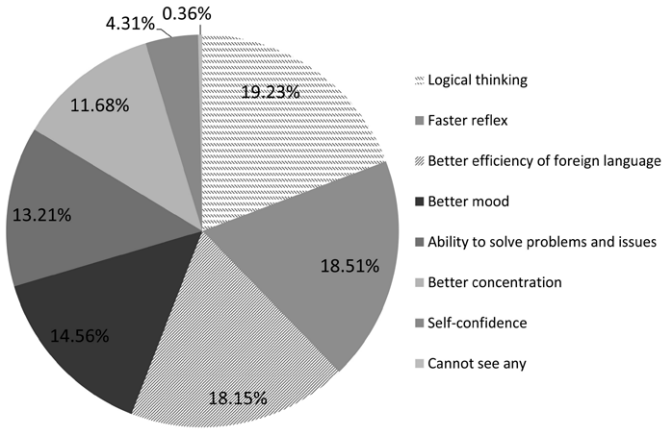

Figure 6. Positive features extended by computer games

Source: Chmielarz and Szumski [2017].

An interesting part of the survey is related to open opinions of respondents. The majority of views had a positive note highlighting the general role of computer games in the didactic process although in aspects of shaping personality and positive characterological traits "[...] it develops personality at many layers […]. We can benefit from every type of computer games […], it [game] can teach new skills and logical thinking [...]". In opposition to positive views, some negative statements were raised highlighting a detrimental effect of computer games, leading to addictions, being alienated from real life and living virtual life "[...] games might be dangerous media tool […], should not be used at universities [...]". Respondents also expressed their anxiety in relation to use computer games to support the didactic process as there are better methods of teaching than computer games.

All above testifies the absence of an explicit approach to use computer games in the didactic process at the university.

Conclusions

The most essential conclusions coming from the whole research are presented below:

- the results from the third stage of the survey confirm the thesis saying that computer games are considered not only as entertainment but also, to some extent, can be seen as a tool for teaching;
- student community represents high level of opinion differentiation related to games and possibility to use computer games to support the didactic process. There is awareness of both advantages and disadvantages of playing computer games. There are positive characteristics influenced by games in people's life and in the didactic process, as well as negative ones, leading to addiction;
- participants believe that computer gaming improves creative thinking and other positive features, mostly associated with logical thinking (19%), faster reflex and better efficiency in foreign language (18%) and university subjects related to those areas might benefit the most from computer games;
- respondents are aware of positive and negative influence of computer games, where the most risky are various addictions;
- gamers are convinced that computer games can successfully support the didactic process, especially learning foreign languages at faculties of economics and/or management. Those faculties can also benefit from computer games to support also psychology, logistics, management and economics;
- according to the research, the most suitable to support the didactic process are games of the massively multiplayer online type and simulation games;
- students highlight the need to create dedicated computer games supporting the didactic process by lecturers, who should lead the initiative to create such games;

- participants also raised a demand to create special computer games, supporting particular subjects specific for the university;
- computer is used by students to search and collect information, communicate with people and view interesting sources of data; moreover, it is used as a translating tool. In this situation computer games can be used mostly to develop and enhance specific attributes used in the didactic process;
- e-gamers and people from their surroundings notice problems related to potential addiction to computer games and try to counteract, even though people that prefer virtual reality state for only 2.5 % of tested e-gamers;
- people that play computer games are divided into two groups. The first group consists of engaged players, that strongly feel emotions related to winning and losing games, the second group is represented by people who treat gaming as one of the forms of entertainment, and do not show emotions that may accompany gaming.

The use of games to support teaching process at the university level it is needed to develop dedicated games focused on teaching purposes. It is essential to design and deploy games that can be used as another source of knowledge, extending standard teaching approach to particular subject. Nevertheless, the students decided that a new approach to teaching in the form of computer games could diversify the teaching process and allow for learning features that facilitate learning. This opens up a new field of research over the content and scenarios of games that are planned to support specific content of planned teaching at different types of universities.

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Determinants of the Use of Computer Games in the Teaching Process

The major goal of this article is to analyse the behaviour of e-gamers and their opinion regarding possibility to use computer games in the didactic process at the university or other higher education institutions. The research was done randomly in an academic environment, using questionnaires, distributed via the Internet. This article is to continue the set of articles dedicated to the analysis of e-gamers' profile and environment that he/she belongs to. The current research is focused on behavioural patterns of e-gamers and possibility to use computer games to support the didactic process at universities. After gathering results of questionnaires, the authors discussed those results and accompanied conclusions.

Uwarunkowania wykorzystania gier komputerowych w procesie nauczania

Głównym celem artykułu jest analiza zachowań e-graczy i ich opinie dotyczące wykorzystania gier komputerowych w procesie dydaktycznym na uniwersytecie lub w innej instytucji edukacyjnej. Badania dokonano losowo w środowisku akademickim, używając ankiet rozprowadzanych przez Internet. Artykuł ten jest kontynuacją serii opracowań dedykowanej analizie profili e-graczy i środowiska, do którego oni należą. Badanie koncentruje się na tworzeniu wzorców zachowań e-graczy i możliwości zastosowania gier komputerowych do wspomagania procesu dydaktycznego na uniwersytetach. Po uzyskaniu wyników badań ankietowych autorzy przeprowadzili dyskusję wyników i wyciągnęli wnioski z badań.