STUDENT'S ATTITUDES TO GAMIFICATION IN THE LEARNING PROCESS

Ondrej Jaško[1] Aleksandar Maljković[2], Mladen Čudanov[3*]

[1, 2, 3] University of Belgrade, Faculty of Organizational Sciences, Serbia
*Corresponding author, e-mail: mladenc@fon.bg.ac.rs

Abstract. *This paper examines gamification, as a multidisciplinary application of game design principles in other contexts. Advent of gamification is especially visible since 2012, and it incorporates several disciplines like psychology, management, game design and education. Our scope of interest is limited to Eastern Europe, where the questionnaire was distributed to assess attitudes and behavior regarding gamification in learning. Main hypothesis of the paper are: Students are familiar with gamification in the learning process; students recognize positive sides and mitigating circumstances which are being delivered with gamification usage; male and female students perceive no difference regarding attitudes and intended behaviors concerning gamification in the learning process. All hypothesis are confirmed using descriptive statistical analysis and t-test.*

Keywords: *Gamification, Learning, Student attitudes, Video games, Technology Acceptance Model*

1. INTRODUCTION

This paper will present basic outline of gamification and elaborate its current usage in the field of learning, with focus on higher education. It will show examples of gamified applications in the field, and empirical research on current attitudes of students regarding gamification.

Gamification is defined as using of games or game elements in the context of problems that have nothing to do with games, but they succeed to motivate users do solve the problems and they increase the level of user influence on predefined problem. By its very definition, we see the multidisciplinary nature of the gamification. Applications of gamification are in business, education and social

- 1979 (''MUD1'') – is created by Roy Trubshaw at Essex University. It was the first multi-user virtual world game.
- 1983. (''Holliday Inn'') - launches the first hotel loyalty program.
- 1996 (Richard Bartle) – publishes ''Who Plays MUAs'' which divides video game players in four unique types.
- 2002 (reversal year) – serious gaming initiative forges a link between electronic gaming industry and training, healthcare, education and public policy.
- 2003 (NikPeling) – coins the term *gamification*.
- 2007 (''Bunchball'') – creates ''Dunder Mifflin Infinity'' for the TV show ''The Office''. It receives over 8 milionpageviews in six weeks.

action, and famous corporate examples of gamification are Microsoft, Nike, SAP, Siemens, Foursquare, Cisco, American Express, Deloitte, Samsung, Dell. Gamification is different from direct usage of video games in other context, as "serious game" describes the design of *full-fledged* games for non-entertainment purposes, "gamified" applicationsmerely incorporate *elements of* games (Deterding et al, 2011).

Main game elements are (Gray, Brown &Macanufo, 2010):

1. Goal of the game - shows us what is expected for participants to achieve.
2. Game area - is the area out of the real world in which participants will play a game.
3. Game borders - are referring to any kind of limits, for example time limits, space limits etc.
4. Game rules - give an explanation of how participants will play a game.
5. Objects - help us to keep up with the game in progress and results during the game.

Deterding et al (2012) have similar view, sorted by level of abstraction, from lowest to the highest:Game interface design patterns (badges, leaderboards, levels), Game design patterns and mechanics (limited resources, turns, time constraint), Game design principles and heuristics (enduring play, clear goals, variety of game styles), Game models (challenge, fantasy, curiosity), Game design methods (play-testing, play-centric design, value conscious game design).

Generally, gamification development has been in the eyes of the researches for years. It is important to mention that history of this concept is not young and that the concept had its marks even in nineteenth century. Next part of the paper will notify some of the most important moments of gamification history:

- 2010 (''Gamification Co.'') – holds the firs gamification Summit in San Francisco, California.
- 2012 (Kevin Verbah) – 45,000 people enrol in Professor Kevin Werbach's online gamification course through Coursera.
- 2014 (''M2 Research'') – predicts that gamification will be a 2.8 billion dollar industry by 2016.

Gamification in education has been applied with success (Sheldon, 2012; Kapp 2013), but in Serbia there was not institutionalized cases of this multidisciplinary practice. There is some research in Serbia covering it with academic field (Čudanov et al. 2014; Parlic et al. 2015). This research is aimed at one of main preconditions for the acceptance, students' attitudes and behaviours.

2. METHODS

Research of gamification usage and recognition by students (University of Belgrade)was conducted using primary data which were collected by questionaire in February 2016. 133 students gave their answers on more than 20 questions via online poll.The main instrument of research was online questionaire created via Google platform – Google Form. Questionaire was constructed on Serbian language and categorised questions in four different groups:

1. Demografic characteristics of examinee
2. Examination of gamification awareness
3. Examination of attitudes on gamification
4. Examination of gamification usage

Questions were grouped in certian entities and gathered answers were analysed. In addition, questions had 1-7 (one to seven) defined values which were given on Likert scale so that collected answers could give us more concise and clearer conclusions. They were also grouped using TAM model (Technology Acceptance Model) which gave an answer on student's acceptance of gamification in the learning process. Furthermore, it gave us a conclusion wheather the level of acceptance is high or low.

Main hypothesis which were set before distribution of questionaire to examinees are:

HYPOTHESIS 1: Students are familiar with gamification in the learning process
HYPOTHESIS 2: Students recognize positive sides and mitigating circumstances which are being delivered with gamification usage
HYPOTHESIS 3: Male and female students perceive no difference regarding attitudes and intended behaviours concerning gamification in the learning process

To check our hypothesis we have used t-test (Krishnaswamy, Sivakumar & Mathirajan, 2004) since QQ plots have indicated normality in the distribution of our variables, having in mind sample size and Marczyk, DeMatteo and Festinger (2005) consider it relatively robust in terms of sensitivity to normality. Conclusions were provided using inductive and deductive reasoning, following guidelines appropriate for research in our context (Saunders, Lewis & Thornhill 2011: 501). Generalization of our results is limited to the context of eastern Europe, but has a relative wide sample of students of all specializations, average grade and state/private universities. Below is given analysis of the demographic traits of our sample.

Examination included 133 examinees of which 63 male and 70 female ones. Conclusio is that questionaire was succesful in the sense of gathering both sides of a person's character and therefore width of research. So, approximatelly equall number of both sexes is good result.

Sum of absolut differences between reverse-control questions and their appropriate - referable questions is thoroughly examined. This is also one of the indicators that can show us how thoughtfull questionaire was fiiled out and what was the level of examinees' concentration.

Our research goal was minimum value of sum of absolut differences.

There are 4 defined control questions and 4 reverse control questions which have their appropriate - referable questions. The smallest difference between one reverse-control question and its appropriate - referrable question can be 0 and biggest can be 798 ((7-1)*133). Individually, differences between reverse control and their appropriate – referable questions are 80, 179, 34 and 14,5 respectively. Their sum is 307,5. Cumulativ of maximum differences can be 3192. So, mistake (variance) during questionaire fill out is defined as ratio – 307,5/3192. That means that thoutghfulness ratio equals 0,903 (90,3%). In the end, we can say that our poll was successful since this ratio value is above 75%.

Next aspect of research is connected with demographic feature concerning examinees. Majority of answers was gathered for students that are currently in their fourth and final year of studies, master studies and people that are fresh post-master graduates. That information indicates that attention of examiner was directed to the people and colleagues of the same age as him – around 24 years of age.

The last demografic aspect of examination was questioning type of education concerning examinees. Approximately, the huge number of examinees came from Faculty of Organisational Sciences (47,3%) while the rest of them came from variety of other faculties (Faculty of Philosophy, Faculty of Medicine, Pharmaceutical Faculty, etc).

3. RESULTS
3.1 Hypothesis 1

After examination of gamification awareness, it was established that answers were pretty much homogeneous speaking about students from Faculty of Organisational Sciences (any module). So, there is not any rule that defines awarenes of any group of studentst towards gamification. For instance, average awareness indexes of students of IT (Faculty of Organisational Sciences' module 1) and students of management (Faculty of Organisational Sciences' module 2) are almost identical (IT – 4,529/10, Management – 4,902/10). Apart from that, AAI of students that are not from Faculty of Organisational Sciences is 2,951 and that can lead us to conclusion tha students which are not from this faculty have less awareness towards phenomena. After all, it can be said that examinees are not so much familiar with this notion althogh they are in everyday touch with it unconsciously. AAI of all examinees is 3,887.

For total sample one sample t-test has been performed to check the hypothesis if mean of the population for the vaiable „Do you have basic knowledge of the gamification" is larger than 3. Results are given in the table below:

Table 1 One-Sample Test, familiarity with gamification

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Are you familiar with the concept of gamification?	3,479	133	,001	,8955	,386	1,405

Important to mention is that there were a few more aspects of this research. Those were the questions for examinees concerning name appointment of known gamification examples and appontment of some faculty subjects that have been using gamification. Just a few of them had an answer on these questions. Out of those few, some of them did not even recognise the true meaning of the questions. Therefore, some of the recognized correct answer were: Nike, Runtastic, DuoLingo, Frikom video game, Foursquare Badges, supermarket coupons, Eko Smile card, etc. Speaking about recognised subjects (Faculty of Organisational Sciences): Theory of Decision Making, Game Theory, Business Inteligence and Marketing Multimedia.

One another aspect of examination was frequency of game playing within people. Together with this data, it was easy to come up with a general goal of this research – global desire for structural change in educational system. Even some lighter changes could be at stake, for example gamification in the learning process. Examined frequency of game usage gave an expected answer – majority of people said that they play games sometimes. As a conclusion, implementation of gamified systems into the educational process would not be unknown or surprising issue.

One of the most important features of this research has to do with type of games which are being played within the examinees. Half of all the answers led us to traditional way of playing – Board games (Monopoly, Cluedo, Risiko, Draw Out, Pictionaire). Right after this one there is a group of Simulation and arcade games (Pro Evolution Soccer, Fifa, Ultimate Fight), puzzles, MMORPG's, etc. The conclusion is that students find their entertainment which do not go far away of simulations and tradition which lies in an integration and interaction with another players. So, most of our examinees were socializers, according to Richard Bartle.

Richard Bartle gave a categorisation of player types through his taxonomy over MUD (Multy-User Dungeon). The four things people typically enjoyed personally about MUDs were:

1. Achievement within the game context. Players give themselves game-related goals, and vigorously set out to achieve them – achievers.
2. Exploration of the game. Players try to find out as much as they can about the virtual world – explorers.
3. Socializing with the others. Players use the game's communicative facilities and apply the role-playing that these engender – socializers.

4. Imposition upon others. Players use the tool provided by the game to cause distress to other players – killers.
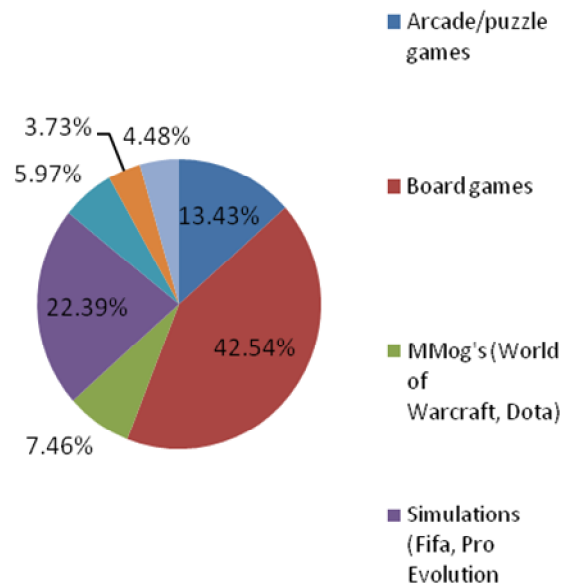

Figure 1. Type of games which are being played

3.2 Hypothesis 2

Students' attitudes were examined and valued on Likert scale, with possibilities of values from one to seven (1-7). Base for this research is TAM (Technology Acceptance Model) which helped us to divide questionaire elements into groups of questions: Perceived usefulness of gamification, Perceived ease of use of gamification, Attitude toward using gamification, Actual use of gamification and Behavioral intention to use gamification. As a unique group for testing, we defined control group of questions.

Next figure shows average values of items according to Technology Acceptance Model (Venkatesh and Davis, 2000), which was used in the learning context already (Mijatovic et al 2013; Horvat et al 2015).
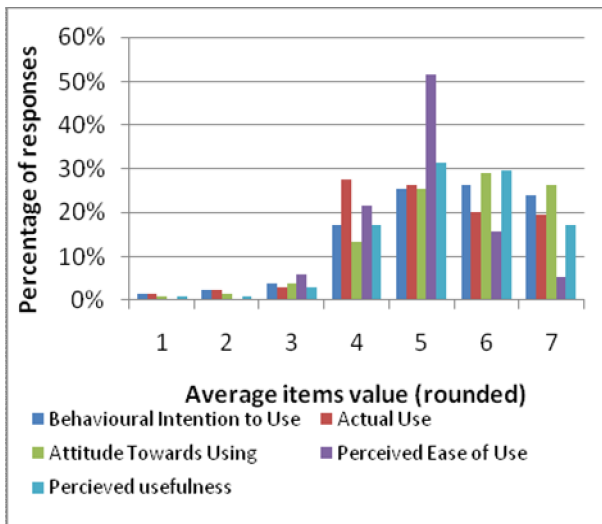
Figure 2. Average item values

Next part of our analysis is related to the hypothesis that there is no statistically significant difference in observed parameters according to gender. Since our variables are normally distributed, as it was checked using QQ diagrams, we have used t-test to check for mean differences between two groups. Levene's test of equality pointed us toward assuming equal variances, since all significance values for F-statistics were much higher than 0,05, so only the equal variances assumed output is presented. Results are given in the tables below:

Table 2 Descriptive statistics analysis according to gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Perceived usefulness of gamification	Male	64	5,226563	1,0962768	,1370346
	Female	70	5,203571	1,1627467	,1389748
Perceived ease of use of gamification	Male	64	5,046875	,9274706	,1159338
	Female	70	4,790476	,8168346	,0976304
Attitude toward using gamification	Male	64	5,637500	1,2083703	,1510463
	Female	70	5,417143	1,2346415	,1475679
Attitude towards taking gamification course	Male	64	5,328125	1,1539247	,1442406
	Female	70	4,928571	1,4378066	,1718508
Behavioral intention for using gamification	Male	64	5,394531	1,2831360	,1603920
	Female	70	5,121429	1,4005323	,1673956

Table 3 Independent samples test according to gender

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Conf. Interval of the Diff.	
						Lower	Upper
Perceived usefulness of gamification	,117	132	,907	,03	,20	-,3641058	,4100879
Perceived ease of use of gamification	1,701	132	,091	,26	,15	-,0417101	,5545078
Attitude toward using gamification	1,043	132	,299	,22	,21	-,1977564	,6384707
Attitude towards taking gamification course	1,764	132	,080	,40	,23	-,0486108	,8477179
Behavioral intention for using gamification	1,173	132	,243	,27	,23	-,1872976	,7335029

4. DISCUSSION

Our research shows there is general positive student perception toward attitudes and behaviours related to gamification. Results are limited to Eastern Europe, which is not perceived as the vanguard of progressive application of new management practices, but in this case results are encouraging. Students show positive attitude toward gamification, and have positive expectations regarding benefits gamification could bring to the learning process. Our research shows that, contrary to common expectation, there are no significant differences in those attitudes between male and female students. Results are illustrated by example of successful gamification in learning.

Example shown is elaborated by Huang and Soman (2013), regarding gamification in healthcare education, which has shown good results on population not limited only to students.Gamification has direct business use n customer engagement, motivation and performance improvement. But education is also appropriate application, where Huang and Soman show how customers can be educated before and after purchase. Healthcare University was developed by Capital BlueCross with the objective of using gamification to teach consumers the

basics of healthcare and how to make value-based healthcare decisions (Huang &Soman, 2013). Healthcare University aims to simplify the process and encourage these consumers to learn and take action. The first 4 topics to be learned are structured as:

- Healthcare reform,
- Marketplace Basics,
- Understanding Subsidies,
- Shopping in the Marketplace.

Further advancement of open online courses discussing gamification is another example. As a separate course or part of another course gamification exists on Coursera, Udacity and EdX as massive MOOC platforms. Coursera „Gamification" course has initially enrolled 63.000 students (Martin, 2012) and has repeated almos in every semester since 2012 .

5. CONCLUSIONS

Our research gave us an insight into the concept of gamification and general knowledge students share on it. Using t-test, descriptive statistics, inductive and deductive reasoning, we have presented evidence that students are introduced with the topic. Also, we have provided insight into examples of concrete subjects including gamification, and so gaming habits of students –their game of choice and frequency of computer games playing. Further, we have shown that attitudes towards gamification are positive in general, covering: Perceived usefulness, Perceived ease of use, Attitude towards using, Actual use and Behavioral intention to use, variables originating from TAM model. Our last hypothesis that there are no significant differences toward gamification between the male and female gender is also confirmed by statistical results.

Limitations and further research is at first aimed at widening the sample and getting better hold of random, representative sample for wider population of students. In those terms, repetition of our research in different countries is encouraged, and we will gladly share methods and tools with other authors. Further, TAM can also be checked in this context for the acceptance of gamification technologies once the sample is large enough to support SEM analysis.

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