Usage of Simulation Games in Higher Educational Institutions teaching Economics and Business

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Abstract

Higher education institutions are embracing technology development and innovative teaching methods in order to prepare their students to be future professionals. New teaching frameworks extend existing learning approaches and set students as main characters of the learning process, which shifts the focal point from educators to students developing their abilities and knowledge. Psychology experts distinguished the role of games and play as an important factor in intellectual development a long time ago. Simulation games in education are widely acknowledged as highly effective methods, which produce numerous positive effects such as higher performance, engagement, and learning motivation. In this paper, we aimed to investigate the usage of simulation games in higher education institutions. The survey research has been conducted on a sample of 180 lectures at several faculties of economics in numerous European countries. The main goal of the paper is to investigate what is the level of usage of simulation games at faculties of economics, with the specific goals of comparing simulation games to the other types of teaching and discuss their advantages as well as barriers towards their usage.

Introduction

Simulation is "any artificial or synthetic environment that is created to manage individual's or team's experiences with reality" (Bell et al., 2008). Simulation games are often described as computer-based instructions provided in an artificial environment in order to achieve new knowledge and skills (Sitzmann, 2011). In higher education, simulation games are considered as scenario-based training, where students gain knowledge and skills thru interaction, teamwork, decision-making and practising skills to real-world situations (Angelini Doffo et al., 2015; Bennet et al., 2017). Higher education organizations usually include in their curricula various types of simulation games such as educational games, digital game-based learning, interactive exercises and applied games often supported by Web 2.0 technologies (Vlachopoulos & Makri, 2017; Yang et al., 2012).

In this paper, we aimed to investigate the usage of simulation games in higher education institutions. The survey research has been conducted on a sample of 180 academics of various European higher educational institutions. This article is structured into five sections. A literature review follows the Introduction. Definition of simulation games, previous research about their usage in education as well as advantages and disadvantages are presented in Literature review. Methodology and collected data regarding the usage of simulation games at faculties in Croatia are described in the third part of the paper. Research results are presented in the fourth section. The last section Conclusion indicates what are limitations and future research steps.

Literature review

Simulation games have been adopted for business and education purposes since the early 1950s (Faria & Nulsen, 1996). In the beginning, simulation games were simple, they consisted of the low number of variables and participants included and the number of products and markets were limited. They have emerged from the primary purposes due to extensive technology development and the variety of game types, which consequently led to a wide spectrum of the game applications and diverse users and adoption fields (Crokall, 2010). It can be noticed that the emergence of the Internet and digital technologies enabled the extensive application of simulation games into educational organization curricula (Fu et al., 2016). Disruptive technologies and digitalization enabled designing simulations that are more realistic, and which can advance operations both in academia and business (Clark et al, 2016).

Over the past ten years, there has been an emerging number of research studies of simulation games usage.

Tsekleves et al. (2014) provided a comprehensive understanding of the benefits and threats of simulation games usage in higher education. DeSmale et al. (2015) draw to close the same conclusion when the results of their investigation carried out that there is a positive connection between the simulation games implementation into the learning process and the learning outcomes. Carenys and Moya (2016) examined the impact on simulation game on students from the behavioural viewpoint. Summary of previous researches can confirm that all previous relevant work agrees on the positive influence of simulation games on teaching and learning processes.

One of the benefits, which are mentioned the most frequently in the relevant publications, is the independence of time and space, so the simulation game could be more affordable than some traditional learning methods. The flexible learning

could lead to a shortened period (Choitz & Prince, 2008). Simulations could be used to mimic a dangerous or unapproachable environment, which provides a possibility to train on them frequently before experiencing them in the real world (Vogel et al., 2006). Finally, the "game" factor is the key factor, which distinguishes the simulation game learning from traditional; it introduces playfulness into the learning process and makes it more interesting and engaging. On the other hand, the simulation games are not just beneficial for students, they are highly useful for educators who can get better disclose of the learning processes of their students (Hernández-Lara et al., 2019).

However, there are some challenges with simulation games implementation into higher education organization. Firstly, although it has stated above that simulation games are more affordable than some traditional methods, the fixed costs of developing them could be expensive, especially for small organizations. For instance, Bell et al. (2008) estimated than e-learning simulations needs between 759 and 1500 working hours of development. Furthermore, some investigation state that simulation games have not yet reached their full potential and are not always beneficial to the learning process (Van Eck, 2006). Besides that, untrained teaching staff and educators who are not interested or reject technology usage could also serve as an obstacle to simulation games full potential utilization.

Data and Methodology

In this paper, data were collected through an online survey conducted in May 2020. The survey was sent by email to professors who are employed at the faculties of economics in Europe. Descriptive statistics methods are used to analyse given results and Chi-square test to investigate are differences regarding usage of teaching methods and student satisfaction statistically significant.

The total number of respondents who participated in the survey regarding the usage of simulation games is 180 (Table 1). A third of the respondents are associate professors (31%). There is quite a similar percentage of respondents who are assistants (21%) and assistant professors (23%). The lowest percentage of respondents are full professors (12%) and full professors with tenure (12%).

Table 1
Academic rank of participants in the survey

Academic rank	#	%
Assistant	38	21%
Assistant professor	42	23%
Associate professor	55	31%
Full professor	24	13%
Full professor with tenure	21	12%
Total	180	100%

Source: Authors' work; Survey conducted May 2020

Table 2 presents country of respondents from the survey. Almost all European countries are included. However, most of the respondents are from Croatia (69%). There are 4% of respondents from Romania and Bosnia and Herzegovina and 3% of respondents from Slovenia and Serbia. Two percent of respondents are from the following countries: France, North Macedonia, Poland, and Russia. The lowest percentage of respondents (1%) is from the following countries: Albania, Austria,

Bulgaria, Estonia, Czechia, Germany, Italy, Montenegro, Portugal, Spain, Sweden and Ukraine.

Table 2
Country of participants in the survey

Country	#	%
Albania	1	1%
Austria	1	1%
Bosnia and Herzegovina	8	4%
Bulgaria	1	1%
Croatia	125	69%
Czechia	2	1%
Estonia	1	1%
France	3	2%
Germany	2	1%
Italy	2	1%
Montenegro	2	1%
North Macedonia	3	2%
Poland	3	2%
Portugal	1	1%
Republic of Serbia	6	3%
Romania	7	4%
Russia	3	2%
Slovenia	6	3%
Spain	1	1%
Sweden	1	1%
Ukraine	1	1%
Total	180	100%

Source: Authors' work; Survey conducted May 2020

Results

Usage of simulation games by the participants of the survey
In the following section, results from the survey regarding the usage of simulation games by the respondents are presented.

Type of teaching used by respondents is presented in Table 3. Most of the respondents prefer active student participation during lectures (91%) along with ex-cathedra (84%) and case studies (83%). Many respondents prefer projects (67%), teamwork (77%) and video clips (57%). Teaching activity like pre-reading of scientific articles prefers 35% of respondents. The lowest percentage of respondents use simulation games in the teaching process (25%).

In Table 4 are presented results regarding respondents' experience with simulation games in teaching. Around half of respondents indicate *I do not use simulation games in class, but I intend to start using them soon* (54%). Approximately one-fifth of the respondents currently use simulation games in teaching (19%) and 12% of respondents used simulation games previously, but not now. There is also 16% of respondents who do not use simulation games in class and do not intend to start using them at all.

Table 3
Type of teaching used by the survey participants

Type of teaching	#	%
Ex-cathedra	152	84%
Active student participation	163	91%
Case studies	150	83%
Simulation games	45	25%
Projects	121	67%
Team-work	139	77%
Pre-reading of scientific articles	63	35%
Video clips	103	57%
Others	8	4%

Source: Authors' work; Survey conducted May 2020

Table 4
What is your experience with simulation games in teaching?

	#	%
I currently use simulation games	34	19%
I used to use them in class, but I'm not doing it right now	21	12%
I do not use simulation games in class, but I intend to start using them soon	97	54%
I do not use simulation games in class and do not intend to start using them at all	28	16%
Total	180	100%

Source: Authors' work; Survey conducted May 2020

Courses, where simulation games will have the highest benefit for students, are presented in Table 5 according to respondents' experience. Most of the respondents agree that simulation games are very useful in Management (21%) as well as for Marketing (19%), Finance (18%) and Entrepreneurship (17%). The lowest percentage of respondents indicate that simulation games can be useful in Informatics (10%) and Supply and trade (9%).

Table 5
In which of the following courses do you think the simulation games would contribute the most?

Course	#	%
Marketing	34	19%
Finance	33	18%
Informatics	18	10%
Management	37	21%
Supply and trade	16	9%
Entrepreneurship	*30*	*17%*

Source: Authors' work; Survey conducted May 2020

## *Comparison of simulation games and other teaching methods*
In the following section comparison of simulation games and other teaching methods are described.

Figure 1 presents respondents' opinion regarding different teaching methods and their contribution to students' satisfaction. The highest percentage of respondents agree that active students' participation (85%), case studies (69%) and simulation

games (78%) significantly contribute to students' satisfaction. Besides, the lowest percentage of respondents (7%) agree that ex-cathedra significantly contribute to students' satisfaction.

Figure 1
Which of the following teaching methods contribute the most to students' satisfaction?
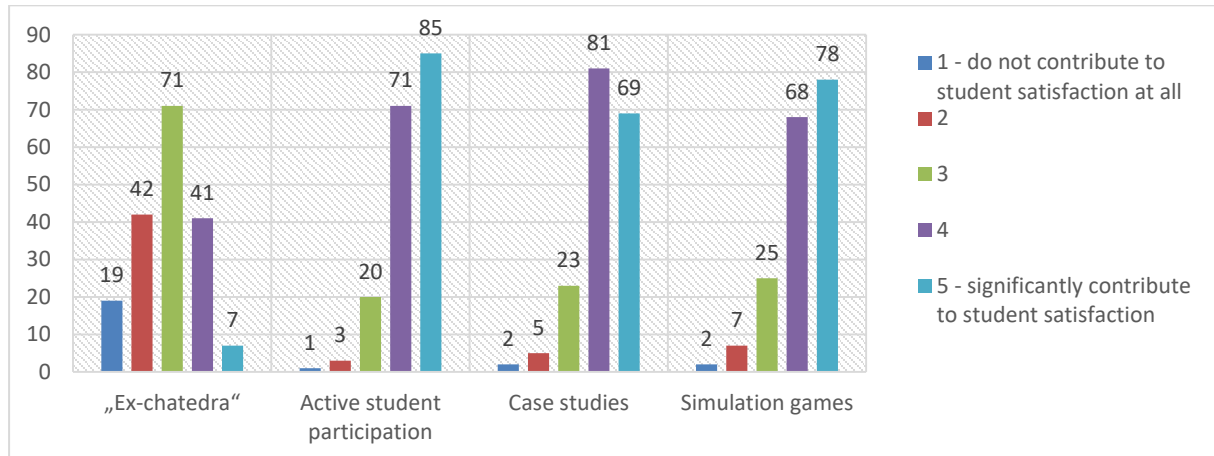
Source: Authors' work; Survey conducted May 2020

The chi-square indicates that the differences observed at Figure 1 are statistically significant at 1%, indicating that there is a strong relationship between the usage of teaching methods and student satisfaction (χ^2=238.748518; p-value=0.000; df=12).

Differences between ex-cathedra lectures and simulation games in teaching outcomes are presented in Figure 2. Regarding students' understanding and participation in class, most of the respondents agree that simulation games provide better results compared to ex-cathedra. Analysing respondents' opinion regarding students' results at the exam, most of them agree that there are no significant differences between the two mentioned approaches. Besides, most of them indicate that simulation games enable better results at the exam for students.

Figure 2
What are the differences between the ex-cathedra lecture and simulation games in teaching outcomes?
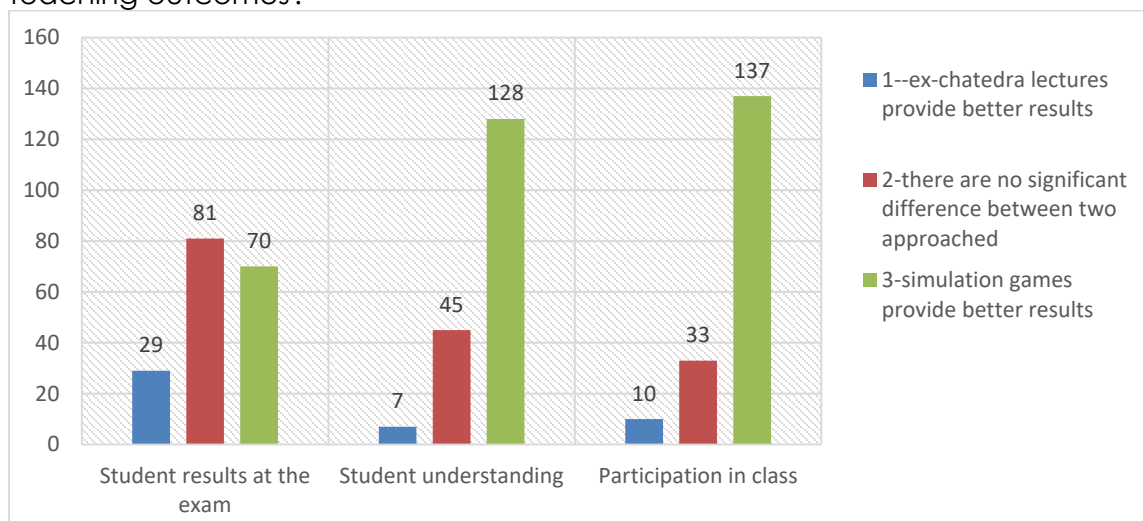
Source: Authors' work; Survey conducted May 2020

As for the Figure 2, the chi-square indicates that the observed differences are statistically significant at 1%, indicating that there is a strong relationship between the usage of teaching methods and teaching outcomes (χ^2=65.795969; p-value=0.000, df=4).

Advantages and barriers of the usage of simulation games

In the following section, results from the survey regarding the advantages and barriers of the usage of simulation games are presented.

In Table 6, the advantages of using simulation games are described. Respondents indicate that there are two the most important benefits of using simulation games: *They increase student motivation* (74%) and *They encourage student collaboration and communication in class* (67%). The same percentage of respondents (37%) indicate that simulation games are fun and enable skills acquisition. Around half of the respondents pointed out that simulation games facilitate learning (46%). The lowest percentage of respondents suggested that benefits of using simulation games are: *They increase the quality of lectures as opposed to "ex-cathedra"* (27%) and *Innovation is always welcome* (22%).

Table 6
Advantages of using simulation games in teaching

Advantage of simulation games	#	%
They increase student motivation	133	74%
They facilitate learning	83	46%
They are fun	67	37%
Skills acquisition	66	37%
They encourage student collaboration and communication in class	121	67%
They increase the quality of lectures as opposed to "ex-cathedra"	49	27%
Innovation is always welcome	39	22%

Source: Authors' work; Survey conducted May 2020

Barriers towards the usage of simulation games are presented in Table 7. Most of the respondents implicit that lack of finances presents the main barrier regarding the usage of simulation games (79%). Around half of the respondents indicate that it is hard to change the way you have worked for a long time (56%). The same percentage of respondents (39%) indicate following statements as barriers when using simulation games in education: *Lack of understanding by management*, *Not required in education* and *It is difficult to adapt to new technologies*. Only 3% of respondents have never heard for simulation games.

Table 7
Barriers towards the usage of simulation games

Barriers towards the usage of simulation games	#	%
Lack of finances	142	79%
Lack of understanding by management	70	39%
Not required in education	71	39%
I have not heard of simulation games	6	3%
It's hard to change the way you work	101	56%
It is difficult to adapt to new technologies	70	39%
Other	11	6%

Source: Authors' work; Survey conducted May 2020

Conclusion

Simulation games have emerging significance in the business and education fields, especially for training and decision-making purposes. Disruptive technologies became affordable and available to the education organizations widely included simulation games in their curricula. Numerous previous investigations confirmed the positive impact of simulation games utilization on the learning process. Higher motivation, engagement, teamwork, and higher academic achievements and social skills are just some of the benefits, which authors state as effects of simulation game usage in the learning process.

The purpose of this investigation is to explore the usage of simulation games in various higher educational institutions, and their outcomes on the learning processes. Our research confirmed the positive influence of simulation games on knowledge acquisition, interactivity and collaboration. However, the number of academics who use simulation games in their teaching is rather low, limiting to approximately one-fifth of academics in the sample. The limitation of this research is that the research sample mostly is focused on the Croatian higher educational institutions. Therefore, future research should be focused to cover the broader range of academics from more European countries.

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