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USING GAMIFICATION FOR TEACHING ECONOMICS IN TECHNICAL HIGHER EDUCATION: AN EXPLORATORY RESEARCH

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Abstract

This paper presents the results of an exploratory research conducted by the authors with the support of students participating in Economics classes within a Technical University in Bucharest, Romania. At the core of the exploratory research are (i) the perspective of „Y" generation students on gamification and (ii) the ability of gamification to influence students in technical higher education in order to achieve better learning performances during Economics classes. Quantitative and qualitative research methods were employed to perform this exploratory research around two main construct: enjoyment and perceived usefulness of gamified learning activity. The exploratory research reveals that gamification in the described context has potential to increase students motivation in learning Economics. The results of the exploratory research boosts the understanding of the gamification phenomenon as a persuasion tool in teaching non-technical disciplines - such as Economics - in a technical higher education environment. However, introducing gamification can be difficult within an inertia context, even if macro environment factor (4th Industrial Revolution accompanied by „Internet of Things) places gamification on learning as a theme that requires attention at the level of Romanian higher education system. Thus, implications and future research are also included in the paper.

Keywords: Gamification; technical higher education; European Millennials; Economics.

1. Introduction

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Corresponding Author: Violeta Simionescu
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Romanian higher education system is facing challenges coming from its micro and macro environment. Following the screening of Romanian higher education system environment, we used STEEPLE analysis tool that asses the factors that can remove or lower barriers to achieve better learning performances. Therefore, for this paper work we have selected the *technological factor* as relevant macro environment factor, more specific, the 4th Industrial Revolution accompanied by „Internet of Things". However, all social, economic or cultural changes in Romania must be seen as relevant sources of challenges for today's Romanian universities, even if they are not specifically addressed in this paper work.

The students who belong to generation „Y" (Millennials), represents the major category of stakeholders of the Romanian higher education system that is at the core of this exploratory research. As elsewhere, in Romania it is becoming increasingly important to motivate students to allocate time for learning: student's time dedicated to learning activities becomes a scarce resource nowadays. In making a choice on how spending time, learning activity is competing against many other available options, most of them generated by the advanced technological status of the universities' environment. It is expected that the second major category of higher education system stakeholders - professors - becomes increasingly aware of the higher education environment dynamics and, particularly, of the changing characteristics of today's students, whose needs they have to address.

Higher education system as social system requires coping with the environment in which is operating. We need to consider what has been changed is the environment in which universities are acting. More, this is of extreme relevance in the context of the 4th industrial revolution.

Roy and Zaman (2016), in a study based on gamification, draw heavily that it is looked at as a possible solution for the observed dropping levels of learners' motivation. Previous research has presented inconclusive findings as to the demonstration of whether gamification works or not.

This paper reports about the perspective of generation „Y" students (within a Romanian technical university attending Economics classes) on using gamification in teaching Economics and on the ability of gamification to influence students to achieve better learning performances.

The research question to which this exploratory research aims to answer is: „Can gamification be more effective than traditional lecturers approach in teaching Economics to „Y" Generation of students within a technical university?". The drivers behind this exploratory research are explained under headline Research Strategy and Method.

The paper is structured as follows: paragraph 2 describes the research approach and findings and the outcome of this exploratory research are included in paragraph 3. The final paragraph, 4, presents the conclusion of the exploratory research.

2. Research Strategy and Method

The work included in this paper is based on an exploratory research. The primary driver for selecting the exploratory research was generated by the need to address all type of questions (what, why, how) for a deep understanding of Romanian "Y" Generation of students perception in relation to gamification in the actual context of Romanian higher education system. The primary driver has been seconded by intention to use this opportunity for helping in establishing further research priorities in this

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area (Christoph, 2010). But the core of this exploratory research cannot be separated from the context. Since the case studies are an adequate research strategy for complex phenomena that cannot be studied outside their context (Yin, 2013), the exploratory research has been found appropriate for analysing the use of gamification in Economics classes within Romanian technical universities.

2.1. Context description

Following the generational theory emerged around 1991 in United States, during 2000, the researchers Howe and Strauss published *Millennials Rising: The Next Great Generation*, examining the Millennials phenomenon in United States from a sociological point of view. The researchers assign the expression „Millennial generation" to those individuals born between 1982 and 2004. Subsequent studies launched the idea that American Millennials are technology savvy (Pew Research Center, 2010).

The advancing of generational theory in the US is accompanied in Europe by initiatives aiming at expanding on or building upon the results of examining the Millennials phenomena in US. Studies published in the inception phase of the researches in Europe were aiming at highlighting similarities and differences on generations of American and European Millennials. Relevant for the context of this exploratory research is the study revealing that there are „basic similarities in Internet and technology usage" when comparing European Millennials with US Millennials (Corvi, Bigi, & NG, 2007)". Meanwhile, European Millennials on their own became object of consideration for research. In August 2016, the results of a survey conducted[1] with the objective of understanding the values, challenges and aspirations that are driving European Millennials were published. The study specifies, among others: "Regarding technology, 8 in 10 of the respondents say they feel empowered by current technology". The "digital native" label for the Generation Y, as coined by Mark Prensky 10 years ago for US is of relevance in the context of this paper work also for European Millennials (Prensky, 2005/2006). The results of studies performed with the purpose of featuring the European Millennials highlights the natural inclination of the generation Y to technology and the fact that they share the same features as American Millennials: they are also technology savvy.

Studies performed around 2010 on teaching methods for Generation Y students specify that „Today's students [...] have little patience for lectures, step-by-step instruction or thinking or traditional testing. Compared to their experiences with digital technology, they find traditional teaching methods dull" (Black, 2010). Generation Y is looking for interactive and participatory learning environments (Price, 2009). It follows that the vehicle used by a professor to communicate the information is requiring a fundamental change.

In parallel with the identification of Millennials features and with the marketing of the need for adapting the teaching methods to the environment – consisting of Generation Y students -, concepts from other areas migrate to educational services and new trends are emerging. In 2014, a new word has been introduced in the Merriam-Webster's Collegiate Dictionary: „gamification", with the following definition „the process of adding games or game-like elements to something (as a task) so as to encourage participation" (Merriam-Webster's, 2014). „Gamification" started the journey for entering into common

[1] global market research player Penn Schoen Berland (PSB) published the results of a survey conducted among European Millennials on behalf of Honor (Huawei Group)

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vocabulary 7 years behind this date (when first used) and won this recognition at the end of 4 years of fighting for recognition (Deterding, Dixon, Khaled, & Nacke, 2011).

Defining higher education as a social system requires exchange of information with the context the system operates in. It is expected that in the learning process, the other major category of stakeholders- the professors- would consider the technological environment as an interest of the other major category of stakeholders: the students.

3. €conomia: Game Used as Learning Vehicle in Economics Classes

During one semester (February – June 2016), all the topics corresponding to the Economics curricula were presented using an interactive teaching style. More specific multimedia slides incorporating text, images, and charts were displayed on a projection system during the classes with the purpose of introducing the Economics concepts. In parallel students were provided with detailed support information for concepts discussed during the classes by email.

For the curricula topic „Monetary Policy", *€conomia* (the interactive game produced by European Central Bank - ECB) has been added to the above mentioned lecture approach, creating role-playing and simulation statuses in the process of setting the interest rates in order to keep annual inflation under 2% over a specific period of time. The aims of using *€conomia* in Economic classes were:

i. to test theories against projections for inflation, production and money growth in a realistic economic environment simulation, where information such as unforeseen economic shocks, the press and ECB board members who often provides contradictory advices represents entry data;

ii. to increase the engagements of students in the learning process through intrinsic motivation, goal setting, and competition.

€conomia as a game provides also incentives, features previously identified by Cristina Ioana Muntean (2011) as means of motivating by providing recognition, status, and the potential for competition among users (Muntean, 2011).

2.1. Research process

€conomia is an intuitive and self-explanatory tool and therefore students were not provided with any formal training. Instead, the concept of gamification and *€conomia* were introduced to the students at the beginning of the class. Students were informed about the rewards mechanism available with the game. *€conomia* is a mobile web application and therefore students were able to further continue their journey using their smartphones or laptops.

The gamified learning activity was composed of two parts:

i. the first part involved the students "playing" the game;

ii. the second part involved the discussions of the game results with the students.

The learning activity has been followed by reflection. The aim of reflection was to transfer the game-based experience and to provide grounds for connecting what included in the game with student's daily life experience, in order to achieve broader learning outcomes.

This is an approach recommended and supported by Nicholson (2015): „in order to be effective [*educational gamification systems*] the shared reflection process should be part of the gamification system

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(Nicholson, 2015)". Nicholsons encourages professors to lead the students to a reflection when gamification systems which do not include reflection are used. This action follows Rodgers (2002) reminder on Dewey's work, who argued in his works done 100 years ago that without reflection after action people do not find the meaning in what they are doing (Rodgers, 2002).

At the end of reflection stage the students were asked to voluntarily participate in a survey about their experience with gamification as learning tool in Economics classes. Questionnaire is the instrument used (i) to evaluate the attitude of students towards the gamification as a learning tool and (ii) to evaluate students' satisfaction level in using gamification compared to classic education tools. The questionnaire was built around the idea to get a snapshot on the experience of students with two main constructs: **enjoyment** and **perceived usefulness of gamified learning activity**.

For the purpose of this exploratory research, the **enjoyment construct used as a starting point the** following definition "the activity of using a specific (learning) system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh & Davis, 2000). Further, the operationalization of the construct within the questionnaire body considered the recommendation of Goetz et al. (2006), in respect of the need to distinguish two different phenomena in assessing enjoyment. More specific, through the included questions, students' trait emotion (intended to refer retrospectively to cumulative experience in enjoying Economic classes) was an object of consideration on its own. The state emotion (current enjoyment of the Economics class when gamification was used in teaching) was treated as a separate object of consideration.

The questions designed for evaluating the **enjoyment** construct and included in the questionnaire are:

i. To what extent do you agree with the following statement: *"The learning experience is more pleasant when using gamification in the Economics' learning process, compared to the use of other aid tools for visualizing the information (partial ICT use or no ICT use)*

ii. To what extent do you agree with the following statement: *It is more pleasant to assimilate Economics concepts when gamification is used, compared to using the traditional teaching system*

iii*. How do you evaluate your experience with using gamification as a tool for communicating Economics concepts/information?*

The perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, Bagozzi, & Warshaw, 1989), with two specific questions:

i. To what extent do you agree with the following statement: *Using gamification in teaching Economics enhances my performance in assimilating the information.*

ii. To what extent do you agree with the following statement: *Using gamification in the teaching process determined a growth of interest for the Economics classes and an increase in the effectiveness of my learning process*.

The above questions are based on a five-point Likert scale with all the sentences scored in a positive scale: (1–to a very small extend/strongly disagree, 2–small extend/disagree, 3–to a moderate extend/undecided, 4–to a large extend/agree, 5- to a very large extend/strongly agree).

Students participating in the survey were asked: (i) to explain their positioning on Likert scale using as reference the question and (ii) to provide additional feedback about their perceptions and attitude

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towards using gamification as learning tool. The questionnaire also asked students: (i) to provide any further thoughts on increasing the use of gamification in Economics classes; (ii) to provide opinions on the below degrees of use of information and communication technologies (ICT) in the education process within sitting classes:

i. No use of ICT, but instead using as an aid tool for visualising the information chalk and blackboard.

ii. Partial use of ICT - providing students with an interface to multimedia slides incorporating text, images, charts, sounds, videos, displayed on a projection system in the class and supporting materials by email – in this specific case.

iii. Full use of ICT, using gamification.

The requirement to provide opinions on the use of ICT in the learning process must be seen in connection with and as an extension of the construct "enjoyment". The survey was answered anonymously by a pool consisting of 20 students at Technical University of Civil Engineering – Faculty of Building Services, Bucharest, Romania using the online questionnaire tool.

Out of 20 students, 90% are male, 10% are female, 40% report themselves as experienced computer gamers (accessing in the last month before survey computer games such as League of Legends, Game of Thrones, FIFA, to name only few), while the other 60% are either non-users or occasional and unexperienced users of computer games.

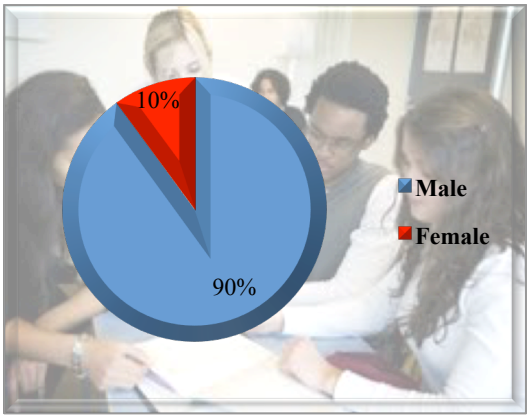

Fig. 1. Respondent`s Gender

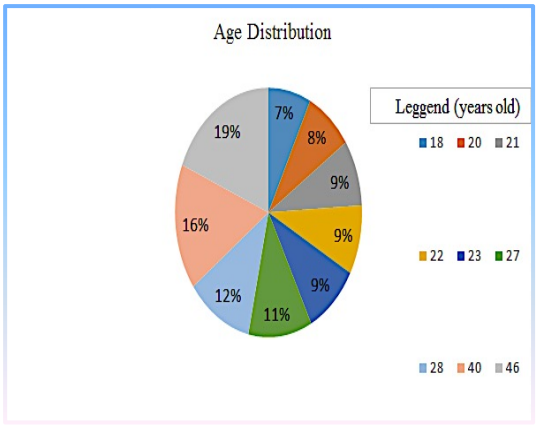

Fig. 2. Age distribution of respondents

3. Findings and Discussion

Under this headline, the results of the two main constructs - *enjoyment and perceived usefullness of gamified learning activity* - are discussed in detail, together with the students experience.

For the enjoyment construct 65% of the participants agree and strongly agree that *"The learning experience is more pleasant when using gamification in the Economics' learning process, compared to the use of other aid tools for visualizing the information (partial ICT use or no ICT use)"*, while 15% have a neutral position (neither agree nor disagree).

About 85% of the students strongly agree (45% to a very large extend and 40% to a large extend) with the statement that "*It is more pleasant to assimilate Economics concepts when gamification is used, compared to using the traditional teaching system*".

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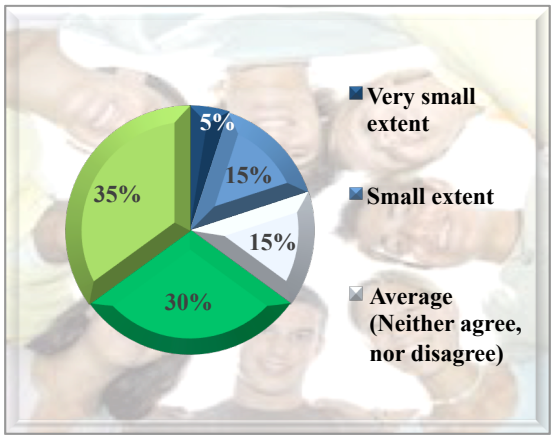

Fig. 3. *Agreement with statement "The learning experience is more pleasant when using gamification in the Economics' learning process, compared to the use of other aid tools for visualizing the information (partial ICT use or no ICT use)"*

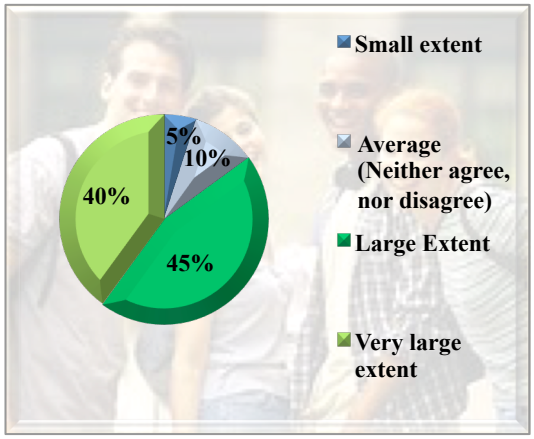

Fig. 4. *Agreement with statement "It is more pleasant to assimilate Economics concepts when gamification is used, compared to using the traditional teaching system"*

About 75% of the students find satisfactory the experience with using gamification in Economics learning process, while 25% find it neutral. None of the participants found the experience unsatisfactory.

For the perceived usefulness construct about 91% of the participants agree (43%) and strongly agree (48%) that *using gamification in teaching Economics enhanced their performance in assimilating the information*, 14% are neutral while 5% considers that to a small extend the gamification enhanced their performance.

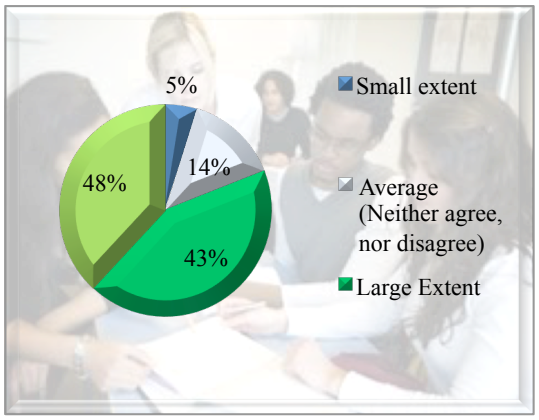

Fig. 5. *Agreement with statement*: "*Using gamification in teaching Economics enhanced performance in assimilating the information*"

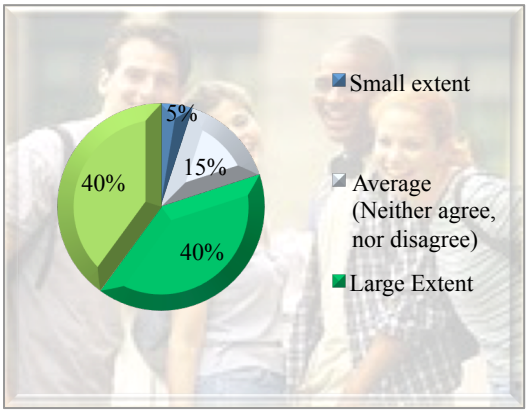

Fig. 6. *Agreement with statement" Using gamification in the teaching process determined a growth of interest for the Economics classes*"

About 80% of the participants agree (40%) and strongly agree (40%) that *using gamification in the teaching process determined a growth of interest for the Economics classes and an increase in the effectiveness of their own learning process and* 15% neither agree, nor disagree, while 5% agree with the statement to a small extend.

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3.1. Student experience

Students found the use of gamification as enjoyable and identified gamification as contributing beneficially to learning Economics. Students were asked to motivate their position on the Likert scale in relation to the addressed questions.

Questions addressing the impact of ICT in the learning process highlights:

i. the dissatisfaction of the students with the non-use of ICT in lecturing process: 40% of the participants find „unsatisfactory" the learning experience in classes while chalk and blackboard is used as aid tool for visualising the information during lectures, while 40% find it neutral. While motivating the answers for degree such as „unsatisfactory", the following epithets are used by students to describe the style: „antique" "obsolete", „ monotonous" or „boring". Students are also detailing reasons for their believes: „the attention vanishes after a very short period of time", „I can't fix the information if the dictation and writing speed is too high"; „attention goes away after a short time" . Students which find this style satisfactory (20%) motivate their satisfaction with reasons such as „it's an important tool for teaching and learning".

ii. The satisfaction of the students with the partial use of ICT in lecturing process. More specific 85% of participants find their experience satisfactory, while 5% are unsatisfied and 10% are unsure about. Reasons motivating a high level of satisfaction include: „It stimulates my interest because I have to think, not just to write like a robot"; „Interaction in the classroom is beneficial to a more effective learning process compared to the classic style of teaching or „the most effective way of teaching and it helps me to easily assimilate information", epithets associated with the degree of satisfaction being: „Interactive" „catchy"

When it comes to the use of gamification in lecturing, 90% of the students finds this experience „satisfactory", the most frequently used epithet being „interactive". Reasons for the high satisfaction includes: "I paid attention to the classes and it was really a nice experience", "it was an ingenious way to make us better understand the topic", "a very effective and interactive way to get my attention".

Results displayed for (i) the two constructs at the core of this exploratory research *(enjoyment and perceived usefulness of Economics gamified learning activity in technical universities environments***)** and for (ii) the students experience in using ICT in teaching process suggest that gamification technique in Economics in technical students environment is an effective tool for enhancing student engagement. Generation „Y" students exposed to the gamification experience - instructiveness and dynamics in the learning process – suggests higher levels of involvement compared to the learning process when other teaching methods are used.

More specific the results are very positive, particularly toward enhancing learning, which is one of the primary objectives of the education. The majority of participants felt that the gamified learning activity improved their learning. Furthermore, the activity did engage the participants and resulted in a high degree of enjoyment.

Through these results the effectiveness of using gamification in teaching Economics in technical universities has been signalled. The positive results of this explanatory research confirm for the Romanian Generation Y students statements previously made in the literature about the teaching

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methods with Generation Y students and further support the use of gamification in Economics classes while demonstrating its effectiveness.

For the second category of relevant stakeholders of the higher education system in Romania, this exploratory research provides an understanding of the Generation Y drivers for performance in learning process.

Within the environment described at the beginning of this exploratory research, it was of relevance to examine and understand the preferences of Millennials for the learning process for at least two reasons: (i) provided orientation for the professors - on how to communicate effectively with the students during the learning process; (ii) highlighted within a particular environment the importance of accepting the features of an open higher education system.

Millennials or „digital native" generation are independent and they feel empowered by technology. Incorporating gamification tools to support the teaching process in the class, further sustain student engagement in learning when games used in the class can be further explored by students using their own communication tools, which contribute to the effectives of the learning process.

4. Conclusions

Using gamification in teaching Economics for students enrolled with technical universities have potential to increase student motivation.

As digital natives, students of generation „Y" expect the use of ICT in the classroom. For them this is natural and therefore they feel attracted by collaborative, interactive and engaging learning environment: they favour learning environments that incorporate ICT.

However, the results are self-reported within an exploratory research and refer to one particular implementation of gamification in Economics classes with students within a technical university,

The results of this exploratory research demonstrate that this particular implementation of gamification – in Economics classes with students from technical university - has beneficial effects, lay the groundwork and invite for further research into the matter. Further research should be conducted to secure the potential bias incorporated in the results and to determine other ways in which gamification can be implemented in education.

Although our work is only one particular use of gamification in education, our results are promising and other applications of gamification in education should be investigated since there is no longer an option using old traditional teaching methods in a world of disruptive changes. While acknowledging that introducing gamification can be difficult within an inertia context, it is a theme that require\s attention at the level of Romanian higher education system .

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