AN EXPLORATORY ANALYSIS ON USING VIRTUAL LEARNING TECHNOLOGIES APPLIED IN THE TECHNICAL FIELD

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Abstract. *In a world of full technological development, having free access to information, the conservative learning process in the technical field must also keep up and adapt to digital culture. With the help of virtual technology, there will be a transition from the classical teaching method, centered on the teacher and printed materials, to an interactive student-centered learning environment, in order to create a connection between the teacher, the student and the learning process in the virtual environment. The components of traditional didactic act: didactic material planning, interaction with students, course support, and final evaluation method should also be implemented in the virtual environment. This paper aims to analyze the perceived impact of using such learning technologies applied to the technical field for certain technical subjects, through a questionnaire that was aimed both at students and at teachers.*

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JEL classification: J11, C8, L86

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1. Introduction

Labor market dynamics require technical schools and also universities to adapt their education offer in accordance, in order to be able to be competitive in regards to the amount of knowledge skills and abilities that their graduates have. Taking into consideration the current state of education in the European Union and the directions in which it is heading, digitization plays a major role in any aspect of society, thus it is important that Romania's education system align and adapt, by bringing modern educational offers to provide support for the future generations. Teaching resources need to be updated in order to meet the challenges and, at the same time, provide effective learning tools for learners as digitization is and will be an important source of economic growth. The main objective is to manage the changes well and turn ongoing digital developments into real opportunities.

The continuous improvement of information and communication technologies, the increasing use and constant adaptation to the requirements of the development of society make digital technologies an optimal environment for the transmission of information, a necessary but not sufficient condition for ensuring the success of the educational process [1].

In addition, policies need to be put in place to address the adjustment costs that the digital transformation of the economy bring about on the labor market. According to the Communication of the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Digital Education Action Plan - 2018 “(...) education and training are the best investments in Europe’s future. They play a vital role in boosting growth, innovation and job creation. Europe’s education and training systems need to give people the forward-looking knowledge, skills and competences they need to innovate and prosper. (...) Europe’s digital transformation will accelerate with the rapid advance of new technologies like artificial intelligence, robotics, cloud computing, and block chain. (...) If education is to be the backbone of growth and inclusion in the EU, a key task is preparing citizens to make the most of the opportunities and meet the challenges of a fast-moving, globalized and interconnected world” [2]. The Digital Education Action Plan “(...) focuses on implementation of and the need to stimulate, support and scale up purposeful use of digital and innovative education practices and it has three priorities: i) making better use of digital technology for teaching and learning; ii) developing relevant digital competences and skills for the digital transformation and iii) improving education through better data analysis and foresight” [3].

Modelling students is a hard and long-term process undertaken by professors, as opposed to managing the changes in the study programs, material resources, which are easier to implement and control. Professors play a key role in streamlining the learning and training activities, in keeping the students' attention awake, and this can be done by using virtual learning technologies as didactic purpose in the teaching-learning-evaluation activities [1]. Modern learning concepts focus on individual learning, working in teams and guidance for finding information using digital media in order to acquire faster and easier the needed skills and competencies required on the labor market, on the one hand and the continuous development of new methods, techniques and equipment used in the educational process, on the other hand. This paper discusses the possible use of virtual learning technologies in a technical field, and analyzes how students and teachers alike perceive such tools, through the use of a questionnaire that was applied to both students and professors in a technical university in Romania.

2. Literature review

The main objective of this research is to analyze the potential impact of using virtual educational tools would have on a technical university, as perceived by the students and professors that attend that university. There are other authors that have conducted research in this field and have found contradicting results in regards to how students and teachers perceive this kind of technology [4] [5], in regards to the effect that using this kind of technology has on their performance. Other authors have experimented with using virtual technologies in other fields, such as medical ones [6], and have noticed that students have a better understanding of how technical procedures function and an improvement in surgical procedures [7] overall.

Thus, taking into account that other domains that have used such technologies in order to try and improve their educational offers and have managed to obtain positive results, we considered that a first step would be to analyze how students and teachers from a technical university would react to the use of virtual educational platforms.

3. Methodology

For the analysis of the impact of the virtual learning technologies in the technical field, a case study was conducted on quantitative analyzing the impact of using virtual learning technologies in the technical field. For this study, we prepared and used a research questionnaire as a technique and investigative tool consisting of a set of written questions and resulting graphical

images, logically and psychologically organized, which, applied to the investigated target group, can determine the answers to be recorded in writing.

The survey was conducted on the active students and professors at “Politehnica” University of Bucharest, a technical university in Romania and was randomly applied to both students and teachers alike, at the Faculty of Engineering and Management of Technological Systems. The paper-drafted questionnaire included nine questions with multiple-choice answers and close-ended questions. The first part of the questionnaire was dedicated to identification of the respondents: age range, gender, occupation. The second part referred to the online activity of the respondents and their opinion regarding the use of general virtual technologies in the educational process. The influence of using these virtual systems had on the time spent in learning online was also important along with the preferred learning method and type of traditional didactic action components that the respondents would like to see as being implemented in the virtual environment. There were 250 responses received, out of which 200 students and 50 professors. The respondents were chosen as to provide a homogenous view on using such technologies in education, and were not separated in their own categories as such.

4. Research results

As mentioned before, the questionnaire was distributed as a paper-draft, and there were 250 respondents, of which 138 were male and 112 were female. We analyzed the differences in how both sexes reacted to utilizing virtual technology, and as show in figure 1., there are no major differences between them when it comes to their preferred learning method, the vast majority of them choosing virtual technology (VR) as their preferred method, with MOOC's as their second, although as it can be noticed the difference between other types of methods is not that large when it comes to the female respondents.

Figure 1. Preferred learning method by gender

When asked regarding the hours spent online almost 75% of the respondents answered that they are spending online 3 hours per day or more, from which almost 87% dedicate this online time to the educational process, see figure 2. Taking into account that the respondents are either

students or teachers, we consider that the amount of time that they declared to spend online for educational purposes to be accurate, the questioner being applied during a pre-examination period.

Figure 2. Distribution of hours spent online

We also asked the respondents their opinion in regards to using virtual technology in the educational process, to which 62% of them had a good or very good opinion on using such technologies, although a large part of the respondents were neutral in their response, concluding that the use of virtual technology in their educational process something that depends on how it is implemented. The number of respondents and their distribution can be seen in figure 3.

Figure 3. Opinion of respondents regarding virtual technology used in the educational process

The most important aspect, in our opinion, is their perception on where virtual technology should be implemented the most, and thus, as shown in figure 4, we can notice the following:

- In regards to using virtual technology to plan teaching materials, majority of the respondents concluded that they would prefer to have virtual teaching materials;

- b) In regards to using virtual technology in order to interact with students, the answers the respondents gave are close in percentages, concluding the fact that it is not virtual reality interaction between students and teachers is not that important to them. Thus we consider that this item should be further researched in regards to why there are so many negative responses.
- c) The vast majority of respondents believe that virtual reality is perfectly used as a didactical resource, and in such we, the authors, can conclude alongside other authors [4] [6] [8] [9], that implementing virtual technology as a resource and combined with other educational methods can bring a positive effect on student performance.
- d) Finally, the respondents considered that virtual reality can be a great tool used as a final assessment method.

Figure 4. Integration of learning tools in virtual environment

5. Conclusions

Taking into account that the present paper presents quantitative results regarding the use of virtual learning technologies applied to the technical field we, the authors can conclude that using such technologies would be preferred to classic teaching methods by students and professors alike in a technical university, not only by medical staff or students as outlined by other authors [6] [7].

Virtual learning tools can be accessed from various devices, such as computers, tablets or smartphones. The process of learning can take place at a time that is convenient for the students; there is no longer any need to be in a classroom, or a library, and thus the new generation of students prefers virtual over physical learning process, due to accessibility aspect of such a method both in regards to not having the need to go to a physical class or interact with physical instruments, and through the fact that the technology itself, as mentioned above, can be used in one form or another outside of premises. This, of course, depends on the subject that is thought through virtual reality, some subjects requiring more advance computers or instruments to better provide an optimal experience than others.

Using such teaching methods should be implemented in fields of education in which the technology allows students and teachers to improve on their skills without having the need to invest in materials or equipment in real life. Thus, using virtual reality in education can improve the performance of students and teachers as long as these are interested in using it in their fields. We, the authors, consider that such a questionnaire should be applied beforehand, in order to measure the perceived impact that using such methods would have on students and professors alike, and also it can be further detailed in order to verify which subjects can benefit the most from such a method.

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