PEDAGOGICKÉ VYUŽITÍ ICT NA VYSOKÉ ŠKOLE TECHNICKÉ V TERCIÁRNÍM VZDĚLÁVÁNÍ

THE PEDAGOGICAL USE OF ICT IN A SCHOOL OF ENGINEERING IN TERTIARY EDUCATION

Griva Anastasia, Thanopoulos Charalampos, Armakolas Stefanos

Abstrakt

Intenzivní rozvoj a zavádění nových informačních a komunikačních technologií (ICT) ve všech oblastech moderního života vyžaduje jejich zavedení do vzdělávání. Integrace nových ICT a identifikace jejich pedagogického využití v environmentální výchově závisí na cílech a cílech. učitelů v terciárním vzdělávání. Tato studie si klade za cíl prozkoumat novou roli, kterou vytvořili učitelé Univerzity v Patrasu ve využívání informačních a komunikačních technologií (ICT) ve vzdělávacím zákoně. Na základě kvantitativní studie se tento výzkum snaží identifikovat svou novou roli prostřednictvím využití nových technologií. Zdá se, že lepší komunikace mezi všemi aktéry v oblasti vzdělávání, jakož i nové vzdělávací postupy a nové role, které by mohly přispět k tomu, aby se učitelé cítili efektivnější a pozitivnější při využívání IKT v každodenní vzdělávací praxi.

Klíčová slova: *ICT, vzdělávací výuka, terciární vzdělávání*

Abstract

The intense development and introduction of new Information and Communication Technologies (ICTs) in every field of modern life makes it necessary to introduce them to education. The integration of new ICTs and the identification of their pedagogical use in environmental education depends on the objectives and the teaching approach adopted by teachers in tertiary education. This study aims at researching the new role developed by the teachers of the University of Patras in the use of information and communication technologies (ICT) in the educational act. Based on a quantitative study, this research attempts to identify their new role through the use of new technologies. Better communication among all actors in education, as well as new educational practices and new emerging roles seem to make teachers feel more effective and positive in using ICT in day-to-day educational practice.

Key words: *ICT, educational teaching, tertiary education*

1 INTRODUCTION

1.1 THE SUPPLY OF NEW TECHNOLOGIES TO EDUCATION

With regard to higher education, the use of computers will not eliminate university textbooks, but it will give a new perspective to the existing system. Teachers will have no longer to organize their lesson exclusively in the textbooks, nor do they make a rudimentary use of the computer. The new forms of technology will be the main tool of teaching aiming at the better organization of the course but mainly in the learning of new and necessary programs. These new programs will also be linked to the labor

market in such a way that their knowledge is not limited to a university environment (Biesta, 2015).

According to Granados and Jaramillo (2019), many universities around the world are using new educational technologies. A typical example is the Institutions of Higher Education in Colombia that have developed institutional policies that enable the integration of ICT into academic structures in an important way, creating an exponential knowledge and supporting formal and informal learning processes. This proves to be a very important motivation for students as it works in an effective way to achieve some learning outcomes compared to traditional learning processes (Marin et al., 2017, Morales Capilla et al., 2015). The use of ICT creates strong learning and teaching environments that enable students to cope with knowledge in an active, self-directed and constructive way (Agbo, 2015). ICT is not just a substitute for teaching strategies in the educational process. Instead, they can be considered as tools to support new ways of teaching and learning (Agbo, 2015). ICTs allow students to reach high educational levels and complete or attain positive educational achievements to contribute to a more equal society and create multiple individuals, social and economic benefits. (Brennan, Durazzi, & Séné, 2013, Hopenhayn, 2003). As a result, the quality and coverage levels of undergraduate programs can be improved (Rodríguez-Albor et al., 2014).According to Granados and Jaramillo (2019), an educational approach based on students' abilities requires the development of mechanisms that transform the teaching-learning process. Teaching practices should provide training based on a specific and unified framework, eliminating the gaps between the university and society (Unigarro, 2017). In other words, the teaching procedures must keep up the professional frameworks reality (Sacristán, 2008). In short, the evaluations must correspond to the pedagogical and teaching suggestions that teachers make in order to reduce the student's "dropout" rates. This means that educational institutions and universities will maintain high quality standards (Toro, 2012).

Nowadays increasing student performance is a new challenge. Therefore, there is a need of changing the traditional teaching approach to promote student-centered university education through the active involvement of teachers who will guide and supervise the learning process (Martín & Rodríguez-Conde, 2004; Pupo & Torres, 2009), allowing students to learn how to learn. Thanks to the efficient use of ICT, the requirements of social context interact with the students' personal characteristics (Pupo & Torres, 2009; Hung, 2012). In this sense, learning techniques (memorization, interactivity, active participation during the lesson, etc.) are approached in a different way, responding to needs as well as to the requirements of the learning curriculum (Camarero, 2000; Zatarain-Cabada & Barrón-Estrada, 2011). These forms can be adapted so that teachers can use them as a tool to understand how their students learn and thus modify or enhance their own didactic approaches that will positively influence the learning processes (Sánchez, 2011; Maric, et al., 2015; Pashler et al., 2008). At the same time, Latin American and Caribbean studies in universities (Lugo, 2014; Sánchez, 2011) shows that the main theoretical approaches in the academy are those of Felder and Silverman (1988) and Alonso, Gallego, and Honey (1995). From different prospects, these theories show that the learning process is facilitated when the style of teaching is favored by the learner.

1.2 ADVANTAGES OF USING NEW TECHNOLOGIES IN THE EDUCATIONAL PROCESS

According to Laurillard (2008), learning is a spiritual activity that through appropriate training programs learners try to analyze the information and use them creatively. With such methodologies, they are able to deal with the needs that may be presented in their workplace (Laurillard, 2008). In addition, ICT shapes the characteristics of the new, electronic environment and the new concepts of information - knowledge - learning, which have specific but very important content, differentiating and adapting the traditional teaching model which is mainly based on teacher and trainee (Laurillard, 2013). In other word, the educational process must ensure that these skills will enable it to cope with the new environment, the feature of which is the continuous effort of creative integration into a rapidly changing world (Laurillard, 2013).

1.3 ICT AND EFFICIENCY

One of the keys for improving teaching is the use of software such as PowerPoint and Word (Word) software, as well as more specialized software such as simulation (static, dynamic and design programs), programming and statistical analysis (Mead, 2015). An interesting topic worth to be presented is the correlation between the use of electronic libraries and the student's average score. That is precisely the case, it deals with the study of Cherry et al. (2013), shows that students with a higher average, tend to use the electronic resources of the University Library of Samford (Birmingham, Alabama) more frequently. In addition, this research in relation to earlier ones focusing on the physical presence of students in the library (Jones, 2011), or more generally in the entire library material (intangible and non-material). Regarding the effectiveness of the electronic library, investigations (Wong & Webb, 2011; Jones, 2011) are undoubted witnesses to the positive correlation between the frequency of use of electronic resources and the high-grade student average. This, of course, implies the need to update the capabilities and services of each University's library throughout the academic community. As far as robotic teleconferencing is concerned, as it is in embryonic stage, it needs improvements and tuning in voice, chatting and screen sharing (Kousis, 2019). Regarding the e-learning efficiency, it is obvious that the two types (synchronous, asynchronous) should co-exist to improve the quality of the course (Anastasiades, 2006). The adoption of software packages and Artificial Intelligence by higher education institutions is another reason that explains the need to integrate them into teaching. However, the main pillar of selecting the right software is always consistent with achieving the teacher's educational goals and the need to communicate directly with the labor market. (Tzimogiannis, 2017).

2 METHODS USED

This paper explores the context of ICT connection to university education and examines how the Tertiary education (TE) was used and the reasons for its use during the TE. Specifically, it focuses on the pedagogical objectives and the didactic approach of teachers in the TE, the type of ICTs, the needs that dictate their use, as well as the main problems and obstacles that arise from their application in practice for active participation of the trainees and more effective learning. The main purpose of the research is to study the state of the universities regarding the integration of new ICT in the educational process of the TE. Teachers use new technologies, but attitudes differ from grade to education. The essential goal of new technology systems in university education is to enhance active participation and promote effective learning. Another purpose of the research is to study the way in which learning becomes more effective

according to the views of teachers teaching in Higher Education. The research questions that this study can answer are as follows:

- Do teachers use new technologies in the day-to-day education process?
- In which grade the participants intergrade the ICTs in the teaching of the University courses?
- Which obstacles teachers face in the use of new technology systems when teaching their courses?
- Which new technology methods teachers use to support the teaching of their courses?
- How effective is their use?
- How satisfied are the teachers with their use?

The questionnaires used in this research study were distributed directly to the respondents and were both hardcopy and online through social networking. The format of the questionnaire used for the purpose of this study was the weighted questionnaire. This questionnaire is considered to be a particularly valid and reliable tool for measuring the degree of use and satisfaction of the use of ICT in tertiary education. The creation of the questionnaire was based on the Zimmerman and Pintrich APM models (both of which are widely recognized) as well as in the relevant literature (Pupo, 2009; Colina, 2008; Sánchez, 2011; Hernández, 2010). The questionnaire includes 16 questions whose purpose is to explore teachers' views on ICT. In particular, this questionnaire is divided into two sections. The first section concerns general questions that focus on our research questions and the second section concerns demographics -individuals - of the sample subjects, for example gender, age, studies, years of service, etc. The questions that were included in the questionnaire were closed-ended questions and allow only specific answers. The questions related to the demographic characteristics-individual data of the sample subjects are characterized as "Independent" variables, while the questions investigating the attitudes, the views of the teachers and the degree of satisfaction of all parties from the use of ICT are characterized as "Dependent" variables.

The survey was conducted between February and April 2019 while the questionnaire was distributed on 20/02/2019 and completed on 10/03/2019. The research was conducted through an electronic and printed questionnaire to teachers of all departments of the Polytechnic School of the University of Patras. The popular SPSS Statistics - Version 24 (Statistical Package for Social Sciences), Statistical Package for Social Sciences, was used to statistically process the collected questionnaires and to draw useful conclusions. Statistical data processing focuses on descriptive statistics, ie frequency analysis.

3 PROCESS AND THE RESULTS OF SOLVING THE ISSUE

Now, we present the results of the research, as they arise from the 37 questionnaires distributed both in print and in electronic form, concerning the sex of the respondents, the age, years of service in the educational sector as members of the faculty of the University of Patras and their place in education.

Before the statistical processing and analysis of the results, Cronbach's correlation coefficient α was calculated to check the reliability of the questionnaire. This index increases as the correlations between the elements increase. For this reason, it is also called an internal affinity index. In other words, this indicator reflects the extent to which

all elements of a cumulative scale measure the same creation. It essentially expresses the homogeneity of the sample. The received values range from 0-1. According to Zafeiropoulos (2015), values of a greater than 0.7 express consistency and ensure consistency and reliability. In our case, it was found that Cronbach's entire questionnaire was 0.7. Therefore, we conclude that our questionnaire as a whole is reliable.

The results of respondents' participation are shown in Table 1. In particular, we observe that the majority of the participants are professors, while the lowest percentage belongs to the instructors. Then, with 25%, the participants stated that they hold the position of assistant professor, while with only a small difference of only 2,8 units they belong to the substitute professors.

Table 1: Distribution of participants in their position in education

Training Position	**Frequency**	**Percentage%**
Instructor	5	13,9
Associate Professor	8	22,2
Assistant Professor	9	25,0
Professor	14	38,9
Total	36	100,0

Below we will present the main findings of our research study on teaching in higher education using new technologies. In this question, if they use new technologies in the day-to-day education process, the majority of respondents (Table 2), 97.3%, answered positively, while only 2.7% said they did not use them.

Table 2: Use of new technologies in the educational process

Seminar Attendance	**Frequency**	**Percentage%**
Yes	36	97,3
No	1	2,7
Total	37	100,0

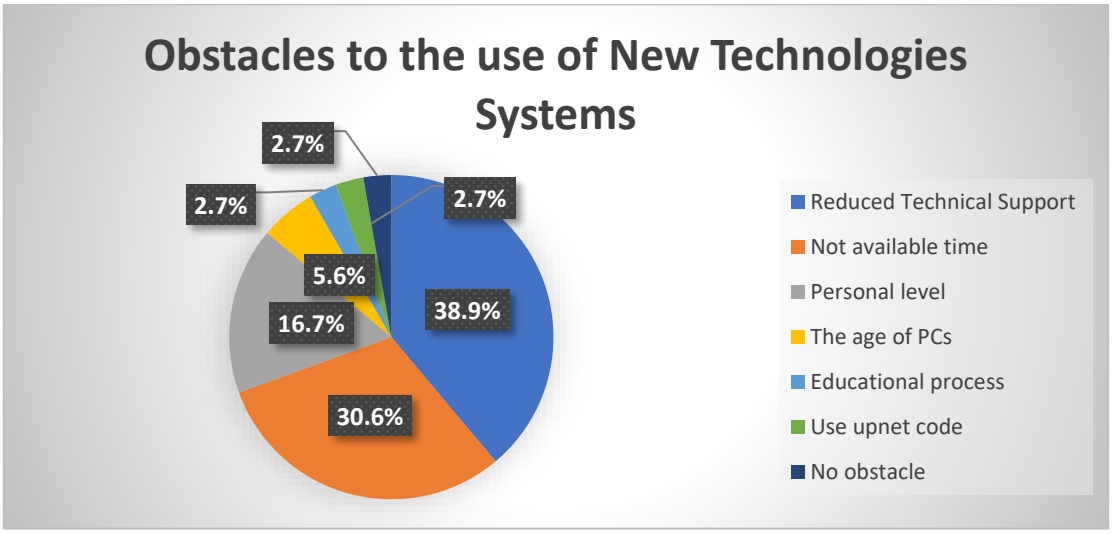
In the question in which grade the participants intergrade the ICTs in the teaching of the University courses (Table 3), only 37.8% responded that they use the new methods to a great extent, while 32.4% said that they use them enough during the teaching. At this point, it is worth mentioning that only 2 people stated that they use only a mere and 1 person that it does not use ICT at all at the delivery of their lessons.

Table 3: ICT integration in educational teaching

Integration in teaching	**Frequency**	**Percentage%**
Too much	14	37,8
A lot	8	21,6
Quite	12	32,4
A little	2	5,4
Not at all	1	2,7
Total	37	100,0

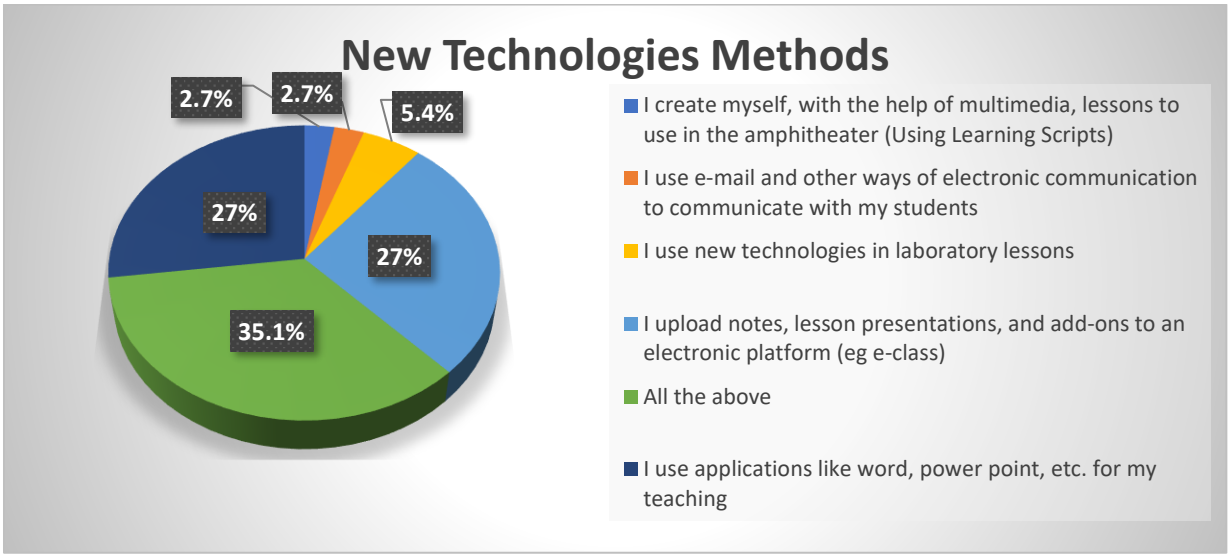
Respondents were asked to answer which obstacles they face in the use of new technology systems when teaching their courses at the polytechnic departments of the University of Patras. More specifically, 38.9% of the respondents argued that the main barrier to ICT use is the reduced support. Then, with 30.6%, the teachers stated that the obstacles are due to the reduced time available for planning and preparation of the educational material, while 16.7% believe that the obstacles are due to their low level of knowledge and ability in use of tools.

Figure 1: Obstacles of using of New Technologies Systems



In the question of which new technology methods teachers use to support the teaching of their courses (Figure 2), 27% responded that they use applications such as word, power point, excel, etc. in order to create more effective teaching. In addition, another 27% of respondents upload notes and presentations of the course as well as additional material to the online platform e.g e-class. Only 2.7% use technology methods in laboratory lessons and another 2,7% use e-mail and other ways of electronic communication to communicate with the students. However, 35.1% answered that they use all the above methods to support their lessons.

Figure 2: New Technologies Methods



In the question, of how effective ICT use is considered (Table 4), the majority of respondents with 37.8% believe that the new technology systems are quite effective, with only 2.7% believe that their use is scarcely satisfactory.

Table 4: Teachers' views on the effective use of ICT

Efficiency of ICT	Frequency	Percentage%
Too much	12	32,4
A lot	10	27,0
Quite	14	37,8
A little	1	2,7
Not at all	0	0,0
Total	37	100,0

In this question if ICT-based teaching contributes to the learning environment (Table 5), 40.5% of respondents replied that the system of new technologies contributes decisively to the learning environment while only 18.9% responded that it affects the learning environment to a minimum.

Table 5: Teachers' views on teaching using new ICTs in the learning environment

Efficiency of ICT	Frequency	Percentage%
Too much	15	40,5
A lot	10	27,0
Quite	5	13,5
A little	7	18,9
Not at all	0	0,0
Total	37	100,0

4 CONCLUSION

Over the past two decades, the focus on integrating and using technology in the context of the school environment is steadily increasing. The European Commission occasionally adopts decisions and guidelines on the integration of ICT into education, the use of hardware and software, and the support of teachers. European states, and not only, are taking initiatives to promote the use of ICT by teachers and tailor their curricula to make integration smooth.

However, in tertiary education, the use of ICT is in primary stage. Despite the positive attitude of teachers and their familiarity with the new technologies, there is a serious problem in the use of ICT. In particular, the majority of teachers in universities have attended a training program for the use of new technologies. At the same time, they use ICT for personal reasons but mainly to help them in the educational process. Teachers use the new technologies to a great extent and integrate them into teaching their lessons while using educational software to meet the learning needs of students.

While using applications such as word, power point and others in their teaching but also uploading lesson notes and presentations of coursework as well as additional material to the online platform, there is the reduced technical support provided by the University Institute, as well as the limited or minimal time available to teachers for the design and preparation of the course.

In other words, although the use of ICTs is necessary for the process of university courses, and their use is particularly effective, as was shown by the answers, however the problems they face are a barrier to the whole process. Therefore, responding to the research questions of our work, we find that new technologies are used extensively and with a high frequency in tertiary education.

In spite of the limitations of this research, due to the small sample and the limited time, we believe that from the findings that have emerged, it is possible to draw useful conclusions that can be generalized for more efficient use of ICT in Tertiary Education. Further research into the use of ICT is needed to be or should be carried out as part of a broader training project.

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