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The impact of educational technology on the academic performance of accounting students

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Abstract

On a global scale, technological developments have affected the field of educational technology, while at the same time economic instability and pandemic crises have reshaped the science of accounting. These events have created a new context in higher education adopting more modern teaching approaches such as blended learning, while the integration of artificial intelligence has increased. It is observed in several university institutions in the accounting courses an intense effort of the professors to improve the performance of their students, through a more experiential educational experience. It is a fact that, as long as blended teaching practices are adopted, student-centeredness is promoted, giving students the opportunity to deeply understand the concepts and application of accounting. The contribution of the present study lies in this entire spectrum and comes to illuminate precisely these challenges that arise from the stormy and rapid technological flow in the field of education. The research is a case study with a quantitative methodology, focusing on the performance of first-year accounting students, through a comparison of the control group and the experimental class in the light of the implementation of a blended environment. The findings of the research showed that while there was no significant statistical difference in student performance between the two classes, however, there was a much more improved picture in the blended class in terms of achieving scores with a 10 "excellent" designation. Today's highly digital literate students need to engage with technology-based educational practices that help them both gain deeper understanding and achieve higher grades.

Keywords: Educational Technology; Academic Performance; Accounting students; Blended Learning

1. Introduction

Educational technology refers to the application of technological resources and teaching methods, with the aim of improving student performance and motivation [1], [2]. The term educational technology is related to Information and Communication Technologies (ICT) in education, which aim to support the educational process and learning. The application of technological processes and tools can be used to solve any problems in the educational process [3], [4], [5], [6]. In recent decades computer networks and modern internet environments have given new impetus to educational technologies, which support models of education and training through distance education and the application of blended learning, with the use of computers and Open Academic Courses (MOOCs). In addition, the technologies of Cloud computing, the Participatory Web, social networking applications (social media), as well as mobile devices and applications (mobile applications) are in many cases used by teachers and students in the educational process [7], [8]. Technological advancement provides innovation within university institutions, which helps instructors design courses to enhance and improve student performance, increasing student satisfaction [9].

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The dynamics of educational technology has not left the field of accounting unaffected, which is taught in many universities around the world [10], [11], [12], [13]. In Social Sciences schools, it plays a key role in undergraduate and postgraduate courses, although the potential of digital educational tools is limitless, universities still lag behind in adopting innovative pedagogical approaches [14], [15]. However, it has been established that teachers do not easily integrate technology into teaching while they know that by using it they can improve student performance and meet their modern educational needs [16]. In addition, it has been identified that asynchronous and contemporary education in accounting courses are associated with positive perceptions as they energize students while improving their retention rates [17]. Professors using lectures and voice-over-PowerPoint can provide a more experiential learning experience to accounting students [18], [19].

Notably, in curricula that teach accounting courses there are challenges for universities in course design and delivery [20], [21], even through virtual reality, offering enhanced performance and positive attitude [22], [13]. On the other hand, there are conflicting opinions that claim that the intensive use of technology in learning accounting and the application of virtual reality are sources of problematic situations, as they reduce human interaction and lead to student alienation [23].

There are several studies that report that in an educational environment that develops blended learning often leads students to achieve better performance [24] offering them deeper learning [25]. There is a view that the performance of undergraduate students in accounting courses can be maximized in the context of hybrid learning through intense interaction and collaboration [26], [27]. All these issues raise reasonable questions in the academic community at a global level, while in recent years aspects of blended learning have been examined in terms of promoting sustainability since, through this particular teaching approach, energy and resource saving techniques can be integrated which also enhance students' environmental awareness [28], [29], [30].

The contribution of the present research comes to illuminate all these issues mentioned above precisely as there is scientific interest in the investigation of educational technology and at what level it affects the performance of accounting students, particularly with the adoption of new more hybrid teaching approaches. Specifically, the purpose of the research is to investigate the performance of students in an introductory accounting course, with the use of educational technology, during the application of blended learning. The following Research Question was posed in the research: ***"Is there a difference in the performance of students in traditional and blended class?".***

The second section presents the bibliographic overview, the third section the methodological design of the research, the fourth section focuses thoroughly on the findings, while the fifth section lists the discussion and conclusions. In the sixth section, there is a reference to the limitations and the proposals for further research, with the citation of the corresponding bibliography for the needs of the present research.

2. Literature Review

2.1. The evolution of education technology

Prensky introduced two new concepts, that of the digital native and the digital immigrant, wanting to separate those who were not born in the digital age. He states that digital immigrants read the user manual, rather than allowing the tool itself to show them its capabilities and how it works [31]. On the one hand are the digital natives, who are characterized by digital literacy, as they grew up with technology which they use in all aspects of their lives [32], [33]. While, on the other hand, are the digital immigrants who do not have much familiarity with the use of technology [34].

In Higher Education, both teaching staff and students often navigate a digital divide, which can create a set of negative effects and consequences on teaching and learning [35], [36]. The continuous technological evolution in the field of education has brought about significant changes in teaching approaches and educational systems, confronting teachers and students in new situations that require the development of corresponding technical, cognitive and sociological skills [37], [38].

These skills are required for teachers to be effective in the modern digital age. In addition, the adoption of new technologies in teaching implies changes in the working environment for academic staff.

Koutropoulos argued that the digital native was the trigger for change at all levels of education, where this new generation of students highlighted the perspective that universities need radical changes to welcome these students and respond to the existing needs [39]. From the beginning the education system was not made for these students and

it must be redefined by combining the capacities of computers, communication and information technologies with the pedagogical changes required in this new context [40], [41].

Of major importance is the transformation of the educational experience so that the use of technology makes sense to the learner himself, this requires mapping and understanding today's students [20]. The educational use of technology is not a panacea that will solve all the problems facing Higher Education today, but it can provide an opportunity to reform itself and play an important role in the future of society [42], [43], [44], [45].

Drent and Meelissen [46] report that while universities have made investments in material and technical infrastructure for the application of ICT in the educational process, however, the teaching methods have not changed. Instructors have two options to decide on. In particular, either ignore the existence of the specific generation of students and continue to teach in the way they were taught, or try to adapt the content of the course to modern requirements [47]. In case the teachers decide to make the transition and adapt to the new data, then a change in the nature of the education is needed in order to cover the skills and interests of the specific students through a cooperative learning in groups [48]. However, only guidance is not enough, but the essential educational use of ICT by teachers is also necessary. The rapid changes that occur in the modern era due to technology constitute an additional challenge and at the same time a new goal of the professional development of teachers [15]. This issue guides them to understand where and how the new technologies they use can add value to learning, so that there is efficiency for themselves and for students [49], [50].

2.2. Accounting and Education Technology

Accounting is a system that collects, processes and communicates financial information, both to internal and external users, in order to make sound financial decisions [51]. Modern technologies have reshaped the daily work of accountants and affected the accounting industry on a global scale [52]. The importance of technology was recognized by the Pathway Commission, established by the American Accounting Association, who is responsible for the structure of higher accounting education [10].

The responsibilities of professors include knowledge transfer and providing guidance and training to students, who are the stakeholders for the integration of technology in the educational system [53]. Universities lag behind in adopting innovative pedagogical approaches. Studies reveal that a key reason why teachers do not embrace the information age is the minimal integration of the use of technology into the educational process [54], [16]. Professors report that there are challenges, time constraints and difficult accessibility at times as the network connection is not good. Also, there is a lack of training and ability to use technology at the level of adoption and lesson planning [55], [56]. Accounting education is deemed necessary to provide assistance to students in order to acquire the knowledge that will develop them into professional accountants. Therefore, learning objectives in accounting education programs must ensure that students receive such an education that prepares them to begin their careers as professional accountants [57].

Over 50 years there has been a need to change accounting education [58]. Goleman argued that if education focuses only on analytical and technical skills, the performance of graduates in the labor market will have a negative impact [59]. It is necessary to strike a balance between soft skills and technical knowledge in accounting education, bearing in mind that there are many relevant competencies beyond technical knowledge, such as communication skills, critical thinking, ethical awareness, lifelong learning and teamwork [57]. For many years, professors in university institutions had no support to teach, apart from their voice, then various educational tools were designed such as blackboards, video projectors, and then digital tools such as PowerPoint, Prezi etc. [60].

The use of technology in an academic environment, particularly through the adoption of blended learning has been shown to offer many advantages, as it is an important factor that creates student interaction and engagement with the course [61]. Technology has revolutionized education, making it a fundamental element of learning. In traditional class (face-to-face teaching), the main sources of information are the professor and books and is a more limited method, which does not enhance critical thinking and interactivity as much as teaching approaches that use technology such as blended learning and the flipped classroom.

Technology enhances the learning experience by making lessons more interactive, stimulating student interest and increasing student engagement [62]. Teachers become "lesson designers" by creating educational materials, by applying useful digital tools to improve teaching methods. It is important that accounting education keeps pace with technological innovation. Therefore, it is necessary to improve teaching methods, making technology a dominant tool to support education. There are several studies that show that educational technology helps students perform better [63], [64].

In recent decades, online simulations have provided an educational experience that is very close to business reality. This knowledge cannot be acquired through traditional learning [65], [66], [21]. Studies report that students with no prior knowledge of accounting who completed their course via computer achieved significantly higher grades than those who only participated in the traditional class. However, this was not the case when students had prior accounting knowledge. This is because technological educational tools can activate and enhance student retention in the classroom [67].

Accounting learning can be computer-based learning (CBL) and even be used to tailor individual needs and abilities through AI [57]. On the other hand, there are conflicting opinions as reported by Powell and McGuigan as they argue that the constant reliance on digital technologies and virtual learning reduces human interaction during accounting learning.

However, the dimension of blended learning is broadened to consider technical knowledge or activities added to traditional methods, synchronous or asynchronous ones [19]. Specifically, different tools and activities can be used, where professors, through lectures, podcasts, vodcasts, quizzes and voice-over-PowerPoint, effectively achieve their educational goals, making the educational process experiential in a multifaceted way. Other studies have shown that blended teaching contributes to promoting student-centered learning and reducing the distance between professors and students [68]. Critical is the issue that in some cases professors often do not have the digital skills required to implement blended learning, as a result of which the chances of effective teaching are reduced [69], [70], [71].

2.3. Academic Performance (Grades)

Today despite the fact that final exams are not a sufficient criterion for obtaining learning outcomes and deeper learning, as students sometimes misperceive success and focus only on the final grade of the semester [72], [74], [75]. however they continue to be the central indicators of course evaluation for some university institutions [76], [73], [77], [21], [22], [23], [24], [25].

In education and specifically in departments of Business Administration, it has been found that when applying the blended teaching approach, student performance improves [78], [49], [79]. Also, online courses are as effective as traditional courses and contribute to the achievement of learning outcomes [65], [38], [57].

Most studies for the most part examine performance through a comparison of traditional and blended class, particularly in the introductory financial accounting course. In research conducted on longer semester accounting courses, it was found that students in the blended class had an improvement in performance compared to those in the traditional class [80], [81].

Hadi investigated students' performance in longer semester accounting courses considering their performance in the introductory financial accounting course and found that the blended learning environment of the first semesters did not affect students' academic performance in subsequent semesters who was taught accounting at an advanced level [82]. In this research, the performance scores are a quantitative variable which is extracted mainly from the final exams of the course and in particular from the grade in the department's records.

3. Methodology

This research is a case study and was conducted through an experiment. It is quantitative and a convenience sample was used, as the sampling process in the research was carried out among students of the Department of Business Administration of a Greek university, who were available and willing to participate.

The population was 176 students attending the second semester of Advanced Financial Accounting undergraduate course and the sample of 60 participants (in experiments it is accepted by the academic community to conduct research with small samples as long as all scientific procedures of validity and reliability have been ensured within the context of the research). In addition, the protection of the students' personal data was respected and their participation was with a code number, in order to ensure their anonymity.

The questionnaires were collected and registered in Excel, then the processing and analysis was done through the SPSS v-23 statistical program, using the Independent Samples t-test for the equality of means Independent Samples t-test for Equality of Means, while the appropriate statistical controls as presented in the next section.

4. Findings

In this section, the findings of the research are presented in detail, first the demographic characteristics of the students who participated in the experiment, then the students' performance during the final exam of the semester in the Advanced Financial Accounting course.

Regarding the gender of the participants in the traditional class with 61% and correspondingly in the blended class with 77%, women prevail.

4.1. Participants' demographics

Being able to evaluate a statistical data analytics model there are used certain evaluation methods. In the current research paper authors adopt one of the widely used evaluation methods, due to its simplicity and optimum results, which is 10-fold cross-validation.

Specifically, such an evaluation method divides the input dataset into 10 equal sized parts and then in a certain loop incorporates the first 9 parts to train the statistical learning classification algorithm and the remaining 1 to test the classifier.

This process is repeated until all the parts are used for training and testing. The proposed evaluation method is adopted in the data analytics methodology since it provides effective results based on certain input data able to explain the observed data source's predictive analytics behavior.

Table 1 Gender

Gender * Class Crosstabulation				
% within Class				
		Class		Total
		Traditional	Blended	
Gender	Woman	61%	77%	69%
	Man	39%	23%	31%
Total		100%	100%	100%

Regarding the age range, in both classes it became clear that the ages up to 24 constitute the majority. More specifically, in the traditional class it reaches 79% and in the blended class 87%.

Table 2 Age

Age * Class Crosstabulation				
% within Class				
		Class		Total
		Traditional	Blended	
Age	Up to 24	79%	87%	83%
	25-34	18%	13%	16%
	35-54	4%		2%
Total		100%	100%	100%

4.2. Analysis of exam scores

The Greek classification system is specific and is followed by all universities (table 3), while the grades for the Advanced Finance course are derived from the gradebook of the Department.

Table 3 Grade scale

Ratings and characterization
Excellent (8.50 – 10.00)
Well done (6.5 – 8.49)
Good (5.00 – 6.49)

After the end of the examination and after the writings of the students who participated in the experiment were corrected, their scores were given, maintaining their complete anonymity, using a participant code.

While, the analysis of the data was done through the comparison of the experimental class and the control group in order to identify any statistical difference.

4.3. Academic performance (Written exams)

Regarding the question of whether there is a statistically significant difference in student scores between the two classes, in Table 4, it was found that there was a graduation from 2 to 10, while the blended class performed better with 27% having a score of 10, while in the traditional only 4%.

RQ: Is there a difference in the performance of students in traditional and blended class?

Table 4 Final exams grades

% within Class				
		Class		**Total**
		Traditional	**Blended**	
EXAM GRADES	2,0		7%	4%
	3,0	11%	7%	9%
	5,0	22%	10%	16%
	5,5	4%		2%
	6,0	4%	7%	5%
	6,5	4%		2%
	7,0	22%	17%	19%
	7,5	4%	3%	4%
	8,0	4%	7%	5%
	8,5	7%	3%	5%
	9,0	7%	7%	7%
	9,5	7%	7%	7%
	10,0	4%	27%	16%
Total		100%	100%	100%

In this specific question, the Independent samples t test for means was tested. The basic conditions of the test are met, as there are no outliers and the data follows a normal distribution in each class.

Table 5 Independent samples t test of final exams grades

Tests of Normality							
	Class	**Kolmogorov-Smirnov[a]**			**Shapiro-Wilk**		
		Statistic	df	Sig.	Statistic	df	Sig.
EXAMS GRADES	Traditional	,132	27	,200*	,946	27	,173
	Blended	,151	30	,078	,880	30	,003

The findings show that the average value of the final exam scores for the traditional class was calculated equal to 6.6 and for the blended class equal to 7.4.

Table 6 Average values of final exam scores

Group Statistics					
	Class	N	Mean	Std. Deviation	Std. Error Mean
EXAM GRADES	Traditional	27	6,6	2,0255	,3898
	Blended	30	7,4	2,5527	,4661

The p-value of the test was calculated equal to 0.224, greater than the α=5% significance level, so the null hypothesis of equality of means was not rejected, as no statistically significant difference was found in the mean of the final scores in the course examination between of the two classes.

Table 7 Level of statistical difference of Final Exam Score

Independent Samples Test								
	t-test for Equality of Means							
	F	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
EXAMGRADES	1,499	-1,229	55	,224	-,7556	,6150	-19,881	,4770

5. Discussion

The Covid-19 pandemic has radically changed the field of educational technology, developing more hybrid teaching methods such as blended learning [50], helping students acquire advanced digital skills [19], [49]. In addition, on a global scale there have been various events such as rapid technological development, cyber attacks, artificial intelligence (A.I), international capital markets, sustainability standards, where they have had an impact on the field of economics and accounting in particular [70].

All this resulted in the technological revolution shifting to academia and university lecturers using modern teaching tools, even from a virtual classroom [13]. Around the world, the prevailing opinion is that modern teaching methods are necessary in the educational process and in accounting courses, which are considered by many students to have a high degree of difficulty [72], [73].

Virtual teaching environments and conditional blended learning allow for a more interactive and experiential experience in the university setting, which can later be used in the graduate work environment [68]. Studies of accounting courses and e-learning, including virtual reality and simulations, have shown improved performance on final exams and positive student attitudes toward accounting courses [22].

In addition, the use of digital games in teaching is an important educational tool and has been the subject of studies at a global level, as it has been found that their adoption contributes to the improvement of the understanding of accounting courses and the performance of students [32], [33], [37], [64] studying whether simulation promotes learning and whether it could help accounting students to check and identify errors in financial statements and the consequences that exist on a case-by-case basis, found great benefits as students connected the theory with practice, achieving high grade performance.

The researchers of the present scientific work converge with the opinions of other researchers through the intensive investigation of the international literature. In particular, they believe that accounting students through the use of technology have higher rates of successful completion of courses with higher grades, as they experience a more engaging educational experience with spatio-temporal flexibility [52], [58], [60], 63]. Today, the integration of technology into accounting curricula is becoming important as developments create challenges for universities and educators [20], [13].

Today's students are more digitally literate than previous generations and typically have high expectations of their studies [8], [20]. It is noteworthy that, there are cases where the value of the marks obtained by students in the final exams is questioned as it is not considered a sufficient criterion in terms of the students' understanding, acquisition of knowledge and development of the corresponding skills [17], [57]. This claim is based on the fact that students who can refer back to past topics and become fully familiar with the result that they perform very well in the formal part of the exams, do not involve substantial learning and corresponding skill development [65].

6. Conclusion

In the study, the question was asked if there is a difference in the performance of the students of the traditional class and the blended class, however, the bibliographic review so far in its majority, showed that it exists with a higher level in the students who attend accounting courses with the blended teaching approach. The present research comes to the same results, although from the initial findings it is clear that there is no significant statistical difference between the traditional and the blended class, as the average value of the final exam scores for the traditional class was found to be equal to 6.6 and for the gross equal to 7.4. Nevertheless, an important finding is the wide spread of scores from 2 to 10 with the blended class showing better scores. It was found through the application of the blended teaching approach that the students participating in the experimental class achieved better performance with 27% presenting a score of 10. In the control group (traditional class) only 4% of its students had a score of 10 with an excellent designation.

The findings of other researchers and those of the present research are identical, while at the same time the dynamic character of the blended teaching approach with the expanded use of educational technology, which contributes catalytically to the academic progress of the students, especially in courses such as accounting, is identified. In addition, it becomes clear that this whole framework positively affects the performance of accounting students not only in the dimension of the grading approach, but with the simultaneous deeper understanding of the scientific field of accounting.

Limitations and suggestions for future research

The experiment was carried out with the participation of 60 students and the conclusions of the present research are not easy to generalize, it is deemed necessary in the future to conduct it with a larger sample and in different study programs. As for the quantitative methodological design, it presents results from which the deeper views of the students are absent, where through a future qualitative research the further views of the students on the field under consideration could be identified and analyzed. In addition, it was observed that while there were extensive researches abroad, however in Greece the literature is very limited and it would be very tempting to carry out similar studies in order to make a more holistic comparison. Education and technology are powerful transformational pillars and as there are rapid developments, constant study and research becomes necessary, as "today is now the past".

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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