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Investigating the potential of e-Learning in healthcare postgraduate curricula: A structural equation model

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Abstract

The objective of this paper is to assess the future adaptability of e-Learning platforms within postgraduate modules. An ongoing empirical assessment was conducted amongst postgraduate students, based on the Technology Acceptance Model (TAM). The current paper presents the outcomes from the second phase of a survey, involving fifty six participants. Data analysis was performed using a structural equation model, based on partial least squares. Results highlighted the very strong effect of perceived usefulness and perceived ease of use to attitude towards using e-Learning platforms. Consequently, attitude towards use proved to be a very strong predictor of behavioral intention. Perceived usefulness, on the contrary, did not prove to have an effect to behavioral intention. Implications on the potential of using e-Learning platforms are discussed along with limitations and future directions of the study.

Keywords:

Educational technology, Technology assessment, e-learning.

Introduction

Over the past few years, the use of Information and Communication Technology (ICT) in education is gaining momentum, with e-Learning initiatives becoming more popular within university curricula, both at undergraduate and postgraduate level. Such frameworks provide flexibility on teaching and learning methods, as they are primarily characterized as location and physical presence independent.

In that context, the aim of this paper is to empirically assess the adaptability of e-Learning frameworks to a postgraduate course. By investigating the perceptions, the beliefs and the attitude of students towards e-Learning platforms and Web-based courses, useful deductions can be drawn for future implementations.

The rest of the paper is organized as follows: The first section provides a description of the methods, emphasizing on the theoretical framework used and the formulated hypotheses. The second section presents the results obtained along with their interpretation. The last section highlights key findings, providing a discussion on limitations and future work in the current field.

Materials and Methods

Theoretical framework and hypotheses

In order to assess the potential adaptability of e-Learning platforms within the postgraduate curricula, an adaptation of the Technology Acceptance Model (TAM) [1] was performed. TAM defines a set of dimensions under investigation along with a set of causal relationships amongst them. In particular, perceived usefulness interacts and affects attitude towards using a technology and behavioral intention, perceived ease of use affects attitude towards use and perceived usefulness whereas attitude towards use affects behavioral intention [1]. A variety of research works in the literature adopt TAM, in its original form or with proposed extensions in conjunction with other theoretical models or by introducing new dimensions under investigation, in order to conduct empirical studies. Such research works span into a plethora of disciplines [2-11], including healthcare [12-15].

In the context of the original TAM, a specific set of hypotheses, based on the theoretical relationships, were formulated. In particular, perceived ease of use (coded as PEOU) positively affects perceived usefulness (coded as PU) (H1+), perceived ease of use positively affects attitude towards Use (coded as ATT) (H2+), perceived usefulness positively affects attitude towards Use (H3+), perceived usefulness positively affects behavioral Intention (coded as BI) (H4+) and attitude towards use positively affects behavioral intention (H5+) [1, 6,10]. The notion of behavioral intention, in the context of the current study, attempts to measure the attitudes and intentions of the participants with regards to the potential use of e-Learning initiatives as part of the learning process at their studies.

Procedure and measures

The Faculty of Nursing at the University of Athens, either independently or through joint University initiatives, offers a broad range of MSc courses, varying from traditional nursing specializations to Health Informatics/Management and Crisis Management. The current study was initiated and focused only to the MSc specialization in Health Informatics-Health Management [16] and then extended in order to gather perceptions and beliefs from past and present MSc students from the whole range of MSc courses offered. Preliminary

results of the current initiative can be found at [16]. The adoption of TAM involved the creation of a questionnaire. Measures from previous research works were chosen, in order to utilize as much standardized metrics as possible (Table 1).

Table 1 - Constructs, measures and relative sources

Dimension	Questions	Source
PEOU	I find that online courses are very easy to use	[14]
	I find that interacting with online courses' doesn't demand much care or attention	
PU	Using e-learning would enhance my effectiveness in learning	[10]
	Using e-learning would improve my course performance	
	Using e-learning would increase my productivity in my course work	
ATT	The idea of using ILM is: (very bad _ very good)	[8]
	The idea of using ILM is: (very foolish _ very wise)	
	Using ILM would be: (very unpleasant _ very pleasant)	
	Using ILM is an idea: (dislike very much _ like very much)	
BI	If I get to use online courses, I intend to use the online courses	[14]
	If I get to use online courses, I expect that I will use online courses	

The questionnaire followed a seven-Likert scale of answering, varying from "strongly disagree" to "strongly agree". All questions were translated from English to Greek accordingly and migrated into a Web based environment, through Limesurvey [17]. Participants were asked to access the web survey through a Uniform Resource Locator (URL). Participation was anonymous and no data that could be correlated with any of the participants was used.

Data analysis was based on structural equation model, specifically partial least squares. Such an approach is well-established at the literature and can be found in a variety of empirical studies adopting TAM or other theoretical frameworks [18-20]. Regarding the software package, SmartPLS M3 v2 was used [21].

Results

Based on the current students enrolled to a variety of MSc specializations, a sample of fifty six (56) postgraduate participants responded at the current study, aiming to submit their intention to use Web based courses. Demographics data is outlined at Table 2.

Table 2 - Generated demographics data

Frequency		Percent (%)	Frequency		Percent (%)
Gender			**Postgraduate Program**		
Male	25	44.6	Health Informatics	23	41.1
Female	31	55.4	Health Management	20	35.7
			Clinical specializations	13	23.3
Age					
20-25	33	58,9	**Previous Experience**		
26-30	15	26,8	Yes	22	39.3
31-35	3	5,4	No	34	60.7
36-40	5	8,9			

Partial Least Squares analysis involved the assessment of the measurement and the structural model [18-20,22,23]. In terms of the measurement model, individual item loadings, internal consistency, convergent validity and discriminant validity were investigated [18-20,22]. All values for individual items loadings were considered reliable (exceeded 0.7) [18-20]. With regards to internal consistency, Cronbach's alpha and Composite Reliability produced values greater than 0.7 and 0.8 respectively [18-20] whereas convergent validity values exceeded the threshold value of 0.5 [24] for reliable results (Table 3). At last, discriminant validity was assessed based on the square root rule of the Average Variance Extracted (AVE) [24]. All constructs produced reliable results (Table 4).

Table 3 - Internal consistency and convergent validity results

	Cronbach's Alpha	Composite Reliability	AVE
ATT	0.8455	0.8969	0.6869
BI	0.7676	0.8937	0.8081
PEOU	0.7171	0.8691	0.7695
PU	0.8684	0.9189	0.7917

Table 4 –Discriminant validity results

	ATT	BI	PEOU	PU
ATT	**0.8287**	0	0	0
BI	0.6907	**0.8989**	0	0
PEOU	0.579	0.5109	**0.8772**	0
PU	0.6799	0.5984	0.3846	**0.8897**

Subsequently, the structural model was observed (Fig. 1). A bootstrapping technique was applied (500 resamples) [18-20, 22] with three statistically significant levels ($p<0.05$*, $p<0.01$** and $p<0.001$***), based on a two-tail test [18]. At Fig. 1, insignificant hypotheses are represented with dotted lines.

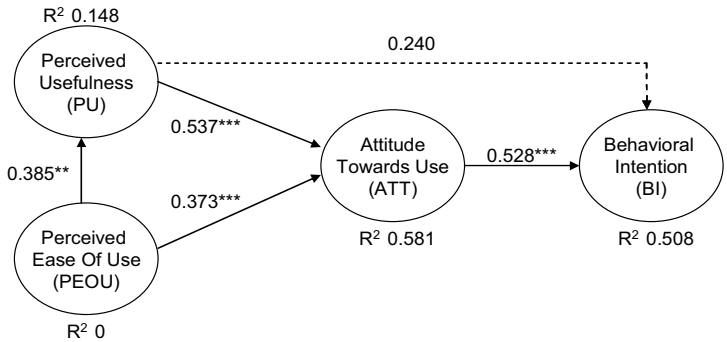

Figure 1 - Structural Model

Discussion

The findings of the structural model highlight the very strong effect of perceived usefulness (β=0.537, p<0.001) and perceived ease of use (β=0.373, p<0.001) to attitude toward using e-Learning platforms. Furthermore, attitude towards use is a very strong predictor of behavioral intention (β=0.528, p<0.001). Moreover, perceived ease of use proved to have a strong effect on perceived usefulness (β=0.385, p<0.01). The only hypothesis that was not confirmed is related with the effect of perceived usefulness to behavioral intention; this could be explained by the fact that the majority of the sample had no previous experience on e-Learning and clearly they could not assess pragmatically the usefulness, and consequently the behavioral intention to use such initiatives.

A comparison with the early stage of this research highlights several similarities and differentiations. Initially, most of the relationships were confirmed, with the exception of perceived ease of use in relation to perceived usefulness and perceived usefulness in relation with behavioral intention [16]. The outcomes of the current study strengthen the relationship of perceived ease of use with usefulness, leaving intact, however, the effect of usefulness to behavioral intention. At this point it should be noted that preliminary research was conducted with a limited sample of twenty (20) people. The enrichment of the sample from a diversity of MSc degree cycles reinforced the reliability of the overall model and its respective dimensions. Such an observation assists in producing more reliable results.

Conclusion

The current work attempted to focus on the empirical acceptance of e-learning initiatives from postgraduate healthcare students. In the basis of the Technology Acceptance Model (TAM) [1] adaptation, several dimensions and causal relationships were assessed and presented. Despite the known limitations, a positive proclivity towards the encapsulation of e-Learning initiatives within the learning lifecycle of postgraduate studies curricula was observed.

The current study possesses a series of limitations, mostly related with the hypothetical nature of the investigation. The assessment is not directly related with an actual e-Learning implementation or a specific class module. It attempts to examine the potential applicability of e-Learning platforms, towards the modernization of lecturing and class practices. Having this as a fact, participants may over or under estimated specific measures throughout the survey process. However, despite the known limitations, the current work aims to shed light and further exploit the adaptability of e-Learning initiatives within healthcare education.

The aforementioned limitations underline the framework for future research in the current field. In particular, a further enrichment of the sample and the assessment of specialized stakeholder groups may be applied as part of future research. In addition, an investigation of moderating factors such as gender or age, as proposed by Venkatesh et al. [25] that could potentially affect the intention to use e-Learning initiatives may also be conducted. Overall, the produced findings of the current work assist in identifying the attitude of students towards learning through technology. Consequently, the results obtained from 'pre-adoption' studies of this kind, may act as a valuable input towards the design and implementation of future plans for incorporating e-Learning initiatives within University educational curricula.

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