Extension of Technology Acceptance Model by using System Usability Scale to assess behavioral intention to use e-learning

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Abstract

This study examines the acceptance of technology and behavioral intention to use learning management systems (LMS). More specifically, the aim of this research is to examine whether students ultimately accept and use educational learning systems such as e-class and the impact of behavioral intention on their decision to use them. An extended version of technology acceptance model has been used by employing the System Usability Scale to measure perceived ease of use and the data analysis was based on partial least squares method. The results were confirmed in most of the research hypotheses. In particular, social norm, system access and self-efficacy significantly affect behavioral intention to use. Therefore, e-learning developers and stakeholders should focus on these factors to enable an educational technology to be effective in educational process.

Keywords: learning management system, behavioral intention to use, technology acceptance model, system usability scale, partial least squares

Introduction

In recent years, the development of information systems has been performed at a rapid pace. This ascertainment raises significant questions related to the acceptance of those systems. By Acceptance of Technology defined as the willingness of a user to use the technology and tools which have been developed to support it (Teo, 2011) is expressed. A significant body of research unveils that users’ intention to use a system is affected primarily by their perceived usefulness and ease of use of it (Dasgupta, Granger, & McGarry, 2002).

Several researchers involved in identifying factors that influence people to accept and use an information system (Hsu & Chang, 2013; King & He, 2006). For these reasons, researchers of information systems at times develop and elaborate different techniques to be able to understand these factors and to predict the success of the systems, improving their design. Investigations i.e. related Technology Accept aim to minimize the rejection of the user technology.

Literature review

Technology Acceptance Model (TAM)

From the decade of 80, the effort to create models to predict the intention to use for particular system is in focal point of researchers. One of the most popular and reliable models has been proposed by Davis (1989). It is named Technology Acceptance Model (TAM) and on average it is estimated that explains the 40% of the variance in usage intention (Ajzen & Fishbein, 1980).
The purpose of this theoretical framework is to examine and explain how and why users accept or reject a technology and specifically to investigate the impact of technology on users' behavior. It is based on a psychological theory, the Theory of Reasoned Act (Ajzen & Fishbein, 1980). The basic premise of this theory is that behavior is influenced by attitude of person toward this behavior, by the individual belief in relation to the result if he adopted it and by the evaluation of behavior (Davis, 1993).

TAM is implemented by using a questionnaire in which the answers are provided in Likert scale, starting from "strongly disagree" to "strongly agree." According to the model there are two key factors in evaluation of acceptance and some others minor factors. So these are the following (Figure 1):

1. *Perceived Ease of Use*: Davis (1989) defines "perceived ease of use" as "the degree to which a person believes that using a particular system would be easy, that it requires no effort."
2. *Perceived Usefulness*: Defined as "the degree to which a person believes that using a particular system would enhance his performance on the job (Davis, 1989)." A system with high "perceived usefulness" is one for which the user believes that there is a positive correlation between the use and performance.
3. *External Variables*: affect "perceived ease of use" and "perceived usefulness" and can be identified as external incentives associated with the system design and could be different for each system (Davis, 1993).
4. *Attitude towards Using*: related to the evaluation of the system by the user and his attitude towards the use, this configures the user's intention to a possible use of the system.

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**Figure 1:** Original Technology Acceptance Model proposed by Davis (1989)

Venkatesh and Davis (2000) tried to expand the model by adding more parameters. The new model is named TAM2. The factors that added and influencing "perceived ease of use" and "perceived usefulness" are social influence determinants and cognitive instrumental determinants. More specifically, these factors are subjective norm, job relevance, output quality, result demonstrability, and perceived ease of use and perceived usefulness.

The TAM model has been used as a tool in many assessments in relation to information systems and is widely accepted by scientific community because of the simplicity that characterizes it (Hsu & Chang, 2013). For this reason, researchers believe that the results are statistically reliable. It can be used as a tool in various environments such as in IT sector for evaluation and investigation of information systems or new products, in distance learning to test users' acceptance and more specifically in platforms which used not only in learning
progress but also in marketing and sales such as purchases over the internet and internet banking.

Park (2009) used an extended TAM model in a study conducted in Korea. As a sample consisted of students from the country's university who had attended at least one course e-learning. The interest of the research focused on investigating the acceptance e-learning course and what factors affect the final acceptance of such courses by students. It turned out that self-efficacy was the factor that most affects the behavioral intention followed by social influence, which explains through the incentive theory of students who have a major influence on whether he will use a course e-learning.

In another study (Saadé, Nebebe & Tan, 2007) used TAM and took part voluntarily 362 students of Concordia University in Canada who attending courses in multimedia learning system and filled out a questionnaire. The purpose of this research was to evaluate students’ satisfaction with this multimedia tool using TAM. Since a diversified TAM is used, it called MAM (Multimedia Acceptance Model). Based on this conceptual model, which was constructed for the purpose of research, it was shown that "perceived usefulness" has a significant impact on attitude to the use of MML and as a consequence, "attitude" plays an important role in the use of behavioral intentions. However, it has demonstrated a negative relationship between "perceived usefulness" of the system and the “behavioral intention” but also between “perceived ease of use” and “attitude”.

Moreover, Dasgupta, Granger and McGarry (2002) tried to investigate the user acceptance of electronic collaboration technology by using a courseware management tool. For the purpose of the study they used an extended TAM and took part 62 students who had attended at three courses and used this tool in one semester. The findings indicates that perceived usefulness had as a positive impact on perceived usefulness instead of usefulness, in turn, has a negative relationship with system usage. In addition, system usage could influence student performance in the course.

Based on TAM another related study (Hsu & Chang, 2013) took place in Taiwan, which purpose was to investigate the acceptance of Moodle by using an extended TAM. In this study another factor was added, the perceived convenience as an external variable. In this study participated 47 college students and 35 senior high school students. The findings shown that perceived convenience could affect perceived usefulness and attitude toward using Moodle and add to this, perceived usefulness affected attitude toward using Moodle.

In 2005 Behrens, Cranston, Jamieson and Jones tried to investigate the acceptance of system «OASIS» (Online Assignment Submission, Infocom System). In this research it was used an extended TAM and as a sample consisted of 112 students separated in two groups, 94 users of «OASIS» and 18 non-users. The findings indicated that as the theory of TAM perceived usefulness and perceived ease of use are effective predictors of systems success and could explain the acceptance of a system.

According to this another researcher, Liaw (2008), tried to investigate learners’ satisfaction, behavioral intentions, and effectiveness of the Blackboard e-learning system and give explanation about the reasons which dissatisfied some learners. He took responses from 424 university students and used an integrated TAM based on social cognitive theory and theory of planned behavior. The findings suggest that there was a significantly correlation between behavioral intention of students to participate in e-learning and effectiveness of e –learning, perceived self-efficacy is the most important factor that affect learners’ satisfaction with the Blackboard e-learning system, and perceived satisfaction and effectiveness could be affected by behavioral intention towards the use of e-learning.

Furthermore, Ngai, Poon and Chan (2007) used an extended TAM to include technical support as a potential factor and they tried to investigate the acceptance of a Web Course Tools
They took responses from 836 university students from 7 Universities of Hong-Kong. The data showed that the factor, technical support, has a significant effect on perceived ease of use and usefulness, while perceived ease of use and usefulness are the dominant factors affecting the attitude of students using WebCT. The findings turned out the importance of perceived ease of use and perceived usefulness in relationship of technical support with attitude and WebCT usage.

Sun, Ray, Glenn, Yang and Dowming (2008) investigated the factors affecting user satisfaction in e-learning because it is shown that many users stop their online learning after their initial experience. In this research was used an integrated TAM and participated 295 students from Universities of Taiwan. The results shown that learner computer anxiety, instructor attitude toward e-Learning, e-Learning course flexibility, e-Learning course quality, perceived usefulness, perceived ease of use, and diversity in assessments are the factors affecting learners’ perceived satisfaction and this results could help the institutions of e-learning environments to improve learner satisfaction and finally the effectiveness of e-learning systems.

System Usability Scale (SUS)

System Usability Scale questionnaire (SUS, Brooke, 1996) is considered one of the most reliable and valid questionnaires to measure users’ perceived usability. The questionnaire comprises just 10 questions / statements which are rated by respondents on a 5-point scale ranging from "strongly disagree" to "strongly agree." The answer to all questions is mandatory and none of these questions can be omitted. The final score ranges from 0 to 100.

Nowadays use of SUS is widespread due to several advantages which characterize it (Bangor, Kortum & Miller, 2008). It is technology agnostic; thus it can be used to evaluate any type of interactive technology, the short length of time required to complete, it can be filled by any user without specialist knowledge. Last but not least it is provided without any charge (Bangor, Kortum & Miller, 2008; 2009). Also one of the key features is its reliability even with a small sample (12-15 persons, Tullis & Stetson, 2004).

The study of Ayad and Rigas (2010) was performed to evaluate the usability of Educational entertainment in e-learning. More specifically, the research involved assessing three systems, Virtual Classroom, Game-based and Storytelling as to the performance of users, the correct answers and satisfaction. The students should have completed the SUS questionnaire and the findings showed that the Game-based platform was the best compared to the other two as regards the performance of users, their satisfaction with the interface and the overall learning experience.

In the Greek context, there is a study (Orfanou, Tselios, & Katsanos, 2015) the purpose of which is to assess SUS applicability in learning management systems (LMS), while simultaneously conducting the validation of the Greek translation of the SUS questionnaire (Katsanos, Tselios, & Xenos, 2012). Then, it investigated the effects of SUS in relation to various factors, such as gender and age. The survey involved 771 students in total across 11 studies. E-Class and Moodle were treated as systems for usability evaluation, which were systems used in courses of their curriculum. It has been demonstrated that the SUS questionnaire is a valid usability assessment tool for LMS’s. Furthermore, it has been demonstrated that the Greek version is valid and reliable (Orfanou, Tselios, & Katsanos, 2015).

Goal of the study/Research questions
This paper examines the acceptance of technology and behavioral intention to use with an emphasis on learning management systems (LMS) educational technology. More specifically, the aim of this paper is to examine whether students ultimately accept and use e-class educational systems and the overall effect of behavioral intention to use them. Our framework is inspired by the research conducted by Park (2009). Thus, the research questions are the following:

1. University students’ behavioral intention (BI) to the use of e-class is affected by their attitude (AT), perceived usefulness (PU), perceived ease of use (PE), e-learning self-efficacy (SE), social norm (SN), system accessibility (SA) and year (Y).
2. University students’ e-class attitude (AT) is influenced by their perceived usefulness (PU), perceived ease of use (PE), e-learning self-efficacy (SE), social norm (SN), system accessibility (SA) and year (Y).
3. University students’ perceived usefulness (PU) of e-class is affected by their perceived ease of use (PE), e-learning self-efficacy (SE), social norm (SN), system accessibility (SA) and year (Y).
4. University students’ perceived ease of use (PE) of e-class is impacted by their e-learning self-efficacy (SE), social norm (SN), system accessibility (SA) and year (Y).

Research method

The present study was carried out in two phases namely the pilot and the main study. The pilot phase was designed to determine whether the developed tool is effective tool and to iteratively amend any potential errors. An attempt to create and analyze models was based on Technology acceptance Model and consists of a total of 8 variables namely year, self-efficacy, perceived usefulness, perceived ease of use, system access, social norm and behavioral intention to use in order to examine how students ultimately accept or not educational technologies, such as e-class and what effect these variables do have on the acceptance of the technology. For this reason, a theoretical model is constructed which is based on model proposed by Park. However, in our model perceived ease of use is measured by adopting SUS questionnaire (Brooke, 1996).

Participants

The sample comprised students of the Department of Educational Sciences and Early Childhood Education of the University of Patras, who used the e-class platform in various courses throughout all years of their studies. This study was carried out from 31/10/2016 and 11/11/2016. 345 students (330 females, 15 males) aged 18-51 (mean = 20.8, SD = 4.8) years participated in the study. 164 participants were in the first year students, 47 attended their second year, 36 the third year, 35 the fourth year, 22 in the fifth and above. In addition, 41 participants were master students of the department.

Materials

Procedure

The participation in the study was voluntary and there was not any motivation for participation. The completion of the questionnaire took place in courses, labs and in the official Facebook group of the department.

Survey instrument

The questionnaire mainly comprises closed multiple choice questions and its objective is to assess the acceptance of a learning system. It consists of 27 questions or statements and some demographic characteristics, such as gender, age, year of study, high school major, and average score. More specifically, it contains questions about the acceptance of the e-class platform, based on the questionnaire proposed by Park (2009), the questions which are based on the key
variables of an extended TAM with appropriate configuration factors for e-learning and finally responses to the systems are given in Likert scale.

Results

For the implementation and the distribution of the survey the Google Forms service has been used. Data analysis was performed using the SmartPLS software version 3 (Ringle, Wende & Will, 2005) and SPSS version 21.

The scenario was analyzed by using the method of Partial Least Squares path modeling, which included the construction of two models: the measurement and the structural equation modeling (SEM) in conjunction with the limited requirements arising on the sample size (Chin, 1998) based on the analysis performed. The Partial Least Squares method is appropriate when the sample is small and when the distribution is asymmetrical (for example a group with many women). The technique initially appeared in the mid-1980s as a modeling method of complex relationships and can be considered as an extension of the regression and factor analysis, but which also addresses the relationship of one or more dependent variables, and between two or more independent variables. More specifically, it analyzed the relations and influences between variables and loadings based on the model. The types of analysis performed were the Exploratory and Confirmatory multivariate analysis.

Measurement model

Validity and reliability were tested for the data. As shown from this model, all loadings except PE_11 was 0.615 and had a value above 0.7. (Table 1).

| Item | Loading | Item | Loading |
|------|---------|------|---------|
| PE_4 | 0.858   | PU_1 | 0.863   |
| PE_5 | 0.704   | PU_2 | 0.857   |
| PE_6 | 0.718   | PU_3 | 0.790   |
| PE_7 | 0.707   | AT_1 | 0.852   |
| PE_8 | 0.720   | AT_2 | 0.809   |
| PE_9 | 0.698   | AT_3 | 0.799   |
| PE_10| 0.737   | BI_1 | 0.834   |
| PE_11| 0.615   | BI_2 | 0.892   |
| PE_12| 0.731   | SE_1 | 0.852   |
| PE_13| 0.721   | SE_2 | 0.840   |
| SA   | 1       | SN_1 | 0.821   |
| E    | 1       | SN_2 | 0.808   |
|      |         | SN_3 | 0.732   |

Discriminant validity: results from the correlations between the variables as shown in the following table (Table 2), according to Fornell-Larcker criterion.
Table 2: Discriminant validity

|     | AT  | BI  | E   | PE  | PU  | SE  | SN  | SA  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| AT  | 0.820 | 0.504 | 0.006 | 0.436 | 0.627 | 0.326 | 0.447 | 0.587 |
| BI  | 0.504 | 0.863 | 0.049 | 0.461 | 0.484 | 0.352 | 0.515 | 0.515 |
| E   | 0.006 | 0.857 | 0.303 | 0.303 | -0.029 | 0.246 | 0.241 | -0.040 |
| PE  | 0.436 | 0.303 | 0.857 | 0.653 | 0.410 | 0.545 | 0.632 | 0.411 |
| PU  | 0.627 | 0.484 | -0.029 | 0.410 | 0.857 | 0.116 | 0.314 | 0.649 |
| SE  | 0.326 | 0.352 | 0.246 | 0.545 | 0.857 | 0.813 | 0.519 | 0.841 |
| SN  | 0.447 | 0.515 | 0.241 | 0.632 | 0.411 | 0.630 | 0.329 | 0.425 |
| SA  | 0.587 | 0.515 | -0.040 | 0.411 | 0.841 | 0.860 | 0.504 | 0.654 |

In addition, according to Henseler, Ringle and Sarstedt (2015), who developed a further criterion for discriminant validity suggest the criterion «heterotrait-monotrait ratio of correlations» (HTMT) as shown in Table 3. This criterion accepted values of less than 0.90 and substantially is a correlation estimate between two variables.

Table 3: «heterotrait-monotrait ratio of correlations» (HTMT)

|     | AT  | BI  | E   | PE  | PU  | SA  | SE  | SN  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| AT  | 0.698 | 0.078 | 0.509 | 0.814 | 0.370 | 0.649 | 0.802 | 0.078 |
| BI  | 0.078 | 0.064 | 0.600 | 0.663 | 0.433 | 0.813 | 0.745 | 0.078 |
| E   | 0.509 | 0.354 | 0.092 | 0.246 | 0.246 | 0.314 | 0.116 | 0.515 |
| PE  | 0.814 | 0.354 | 0.575 | 0.479 | 0.575 | 0.860 | 0.519 | 0.841 |
| PU  | 0.370 | 0.354 | 0.314 | 0.479 | 0.575 | 0.314 | 0.649 | 0.802 |
| SA  | 0.649 | 0.314 | 0.519 | 0.649 | 0.649 | 1.000 | 0.813 | 0.745 |
| SE  | 0.802 | 0.649 | 0.519 | 0.649 | 0.649 | 1.000 | 0.813 | 0.802 |
| SN  | 0.078 | 0.078 | 0.116 | 0.116 | 0.116 | 0.802 | 0.813 | 1.000 |

For the purpose of this study a reliability analysis has been performed by using 2 tests. Cronbach’s Alpha (α) observed that this rate is above 0.70 in all variables except social norm in which value is quite close 0.699, in contrast to the pilot study where several variables values were low and therefore a larger sample had better results. In addition to that, a second test called “Average Variance Extracted” (AVE) should exceed value more than 0.50 for each variable. Based on the data obtained in this assessment, it was found that the recommended levels of AVE values belong to the interval from 0.67 to 1 (Table 4).

Table 4: Reliability (α, AVE, Composite Reliability)

|     | Cronbach's Alpha (α) | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|-----|----------------------|-------|-----------------------|----------------------------------|
| AT  | 0.758                | 0.759 | 0.861                 | 0.673                            |
| BI  | 0.722                | 0.750 | 0.854                 | 0.745                            |
| E   | 1.000                | 1.000 | 1.000                 | 1.000                            |
| PE  | 0.746                | 0.758 | 0.856                 | 0.665                            |
| PU  | 0.786                | 0.786 | 0.876                 | 0.702                            |
| SA  | 1.000                | 1.000 | 1.000                 | 1.000                            |
| SE  | 0.715                | 0.710 | 0.834                 | 0.716                            |
| SN  | 0.699                | 0.705 | 0.830                 | 0.620                            |
The VIF index is used to describe how strong correlation between model parameters has been developed. Thus the acceptable limits to be considered as satisfactory correlation (Zuur, Ieno & Elphick, 2010) is from 1 to 5. Hence, in accordance with the data of present study it was observed that all correlations, that is the correlations between variables and between questions of each variable, belong to the accepted interval. (see Table 5 and Table 6)

**Table 5: VIF among factors**

|     | AT  | BI   | E    | PE   | PU   | SA   | SE   | SN   |
|-----|-----|------|------|------|------|------|------|------|
| AT  | 1.947 |      |      |      |      |      |      |      |
| BI  | 1.175 | 1.179| 1.139| 1.169|      |      |      |      |
| E   | 1.583 | 1.592| 1.582|      |      |      |      |      |
| PE  | 1.747 | 2.027|      |      |      |      |      |      |
| PU  | 1.411 | 1.419| 1.281| 1.406|      |      |      |      |
| SA  | 1.601 | 1.638| 1.404| 1.540|      |      |      |      |
| SE  | 1.856 | 1.970| 1.325| 1.359|      |      |      |      |

**Table 6: VIF among items**

|     | PE_4 | 1.762 | AT_1 | 1.833 | SE_1 | 1.23 |
|-----|------|-------|------|-------|------|------|
| PE_5 | 1.834 | AT_2  | 1.656 | SE_2  | 1.23 |
| PE_6 | 1.275 | AT_3  | 1.366 | SN_1  | 1.388|
| PU_1 | 1.951 | BI_1  | 1.323 | SN_2  | 1.433|
| PU_2 | 1.895 | BI_2  | 1.323 | SN_3  | 1.277|
| PU_3 | 1.413 | E     | 1    | SA_1  | 1    |

**Structural model**

In order to estimate the model (see Figure 2), the pertinent bootstrapping technique was applied (two-tailed test) and the examination of t-statistics values with significance level p <0.05 and t statistics> 1.96. With respect to the data obtained, it was shown that eventually the majority of relationships are statistically significant with strong effects. More analytically, the effects and a comparison of the present study and Park are depicted in the following table (Table 7).

**Table 7: Parameter estimates, t-value, results of hypotheses and comparison of the current research and Park**

|     | Direct Effect | t-value | Indirect Effect | Total Effect | p     | Result of Hypothesis | Park (2009) |
|-----|---------------|---------|----------------|--------------|-------|----------------------|--------------|
| AT-> BI | 0.150 | 2.350 | - | 0.150 | 0.019 | Supported | Supported |
| Y-> AT | -0.044 | 1.261 | 0.015 | 0.056 | 0.208 | Not supported | - |
| Y-> BI | -0.047 | 1.151 | 0.018 | -0.051 | 0.250 | Not supported | - |
| Y-> PU | 0.132 | 3.464 | - | 0.132 | 0.001 | Supported | - |
| PE-> AT | 0.091 | 2.196 | -0.004 | 0.142 | 0.029 | Supported | Supported |
| PE-> BI | 0.91 | 1.723 | 0.009 | 0.127 | 0.086 | Not supported | Not supported |
| PE-> PU | 0.142 | 1.921 | - | 0.142 | 0.055 | Not supported | Supported |
| PU-> AT | 0.368 | 6.826 | - | 0.368 | 0.000 | Supported | Supported |
| PU-> BI | 0.108 | 2.179 | 0.06 | 0.163 | 0.030 | Supported | Not supported |
To start with behavioral intention, it was tested that five hypotheses were confirmed and especially, perceived usefulness, system access, social norm, attitude to e-class and self-
efficacy have statistically significant effects, even though they were not supported by the relevant hypotheses for year and perceived ease of use. In particular, the effects of self-efficacy (0.247) and social norm (0.19) were very strong. On the contrary, the effect of system access was not so strong (0.076).

Regarding the effects of the parameters on attitude to e-class, it was found that four hypotheses were supported, compared with the Park model which supported three. Precisely, the hypotheses which were confirmed to have significant effects are perceived usefulness, system access, social norm and perceived ease of use. In contrast, the underlying assumptions for the year and self-efficacy were not verified. Perceived usefulness (0.308) and social norm (0.246) had particularly strong influence on attitudes towards e-class, whilst system access did not have such a strong effect (0.055).

With reference to the effects of parameters on perceived usefulness, it was found that several cases were confirmed, and specifically system access and social norm are proved to have statistically significant effects, whereas this does not apply to the underlying assumptions for year, self-efficacy and perceived ease of use, all of which had minor effects. A strong effect was traced with social norm (0.513), which is by far the largest in this model, while the effect of system access is insignificant, reaching only 0.008.

Finally, all effects on perceived ease of use were validated, among which year, self-efficacy, system access and social norm are identified, with those of self-efficacy (0.424) and system access (0.302) having stronger effect, while that of year was not that strong (0.132). The index values (R²) for each of the dependent variables that appear to belong from 0.53 up to 0.71 are listed below (Table 8). Thus, it is indicated that the percentage of dependent variable explained by behavioral intention is quite high with 70.9%, a percentage that belongs to the space above 63% and is seen as a strong dispersion rate.

| Factor | (R²)|
|--------|----|
| AT     | 61.7 %|
| BI     | 70.9 %|
| PE     | 52.8 %|
| PU     | 55.3 %|

**Conclusions**

In this paper, the assessment of acceptance and behavioral intention to use LMS using a modified version of TAM is examined. It was found that the factor of self-efficiency appeared to have a significant impact not only on perceived ease of use, but also on behavioral intention. Furthermore, it should be stressed that this finding was put forward by Park (2009) who came to the conclusion that this factor affects behavioral intention the most, an effect which is also supported by the original TAM theory (Davis & Venkatesh, 2000). One possible explanation for the influence of self-efficacy could be interpreted through incentive theory as postulated in the work of Bandura (1994) and the theory of intrinsic motivation, which support that higher self-efficacy leads to better results in the learning process and in this case, the use of the e-platform. Therefore, self-efficacy is related to behavioral intention to use and perceived ease of use of the e-class platform. However, there are is no statistically significant relation between self-efficacy and attitudes towards e-class and perceived usefulness.

In addition, it bears confirmation to the fact that perceived usefulness has statistically significant effects on both attitude towards e-class and behavioral intention to use. More specifically, as is the case in the theory of TAM, perceived usefulness was proved to affect behavioral intention affair which was not verified in the study conducted by Park (2009). This
could be attributed to the fact that in Korea, students are already familiar with using the Internet in their daily life and, as a consequence, their familiarization with it is a great facilitator in their academic life, while in Greece the use of educational technologies and specifically the use of LMS constitutes a novel practice for students who are not fully accustomed to using them while learning a specific subject. Moreover, this study proves that perceived usefulness influences attitude towards e-class, an effect which is supported by Park’s study, because it is considered to be particularly important as the field of marketing. At this juncture, in a positive atmosphere, students themselves create a positive attitude towards this platform that can contribute positively to students re-employing and making avail of a similar platform.

As far as social norm is concerned, it appears to have statistically significant effect on behavioral intention to use, attitude, perceived ease of use and perceived usefulness. Social influence can affect the way users accept a technology and shape their behavior towards it (Gradon, Alshare, & Kwan, 2005). This ascertainment was also reached in part by Park (2009) who confirmed statistically significant effects between social norm and attitude, behavioral intention to use and perceived usefulness. As mentioned previously, social factors affect significantly students in Korea, because in this country, everybody is encouraged to use educational technologies in education.

In Greece, confirmation of these relationships may be explained by the model of modern society, in which technologies play a significant role. Besides this, the fear of exclusion from social environment in case where someone is not technology literate is a factor which plays an important part in young people’s behaviors. Subsequently, young people encourage each other to use educational technologies either because they influence each other, or because they do not want to be regarded as 'digitally illiterate', or because they believe that it is this approach will help themselves in their future career path.

Another important factor which was observed to have significant mediation effect is system access, on the ground that it verified the effects among behavioral intention, attitude, perceived ease of use and perceived usefulness. However, the findings for this factor differ with those reported by Park (2009) since the only relationship that confirmed it was between perceived ease of use. In Korea, an infrastructure system for the web has been already developed, thus being very common to students in universities. In consequence, they do not worry about system access, since they know that there are the appropriate facilities and there are not any problems with access. However, in Greece, technology dissemination is less developed than in Korea and this is ascribed to the fact that system access plays an important role in technology acceptance as well as in shaping perceptions about the technology.

Moreover, the effect of attitude towards behavioral intention effect was confirmed, further verifying Park’s ascertainment, as the attitude of students to educational technology can shape behavior towards it and eventually lead them to accept it or not. Lastly, the factor of student’s academic year, which was introduced for examination in this study, was found to be affected only by perceived ease of use at a significant level. This can be interpretable by the degree to which a person believes that the e-class will be easy to use is influenced by their age, and their accumulated experience with the LMS technology, a finding which is in line with the findings reported by Orfanou, Katsanos and Tselios (2015).

Moreover, it was shown that perceived ease of use had had statistically significant effect on perceived ease of use and attitudes towards e-class. This effect was also found by Park, as it can be explained through TAM theory, as based on how easy the students believe the system use is, students can accordingly shape an attitude to it altogether. All in all, the findings were:

**RQ1:** According to the analysis, behavioral intention to use is greatly affected by social influence, system access but also perceived usefulness, self-efficacy and perceived ease of use. However, it was not supported by the hypothesis year and behavioral intention.
RQ2: The factor of attitude towards e-class was found to be mainly influenced by system access and then social influence and perceived usefulness but seemed not to be influenced by year and perceived ease of use.

RQ3: University students’ perceived usefulness of e-class is affected mainly by social norm and system accessibility. However, the effects of perceived ease of use, e- self-efficacy and year were not supported.

RQ4: Finally, the hypotheses about students’ perceived ease of use were supported which were affected by their e-learning self-efficacy, social norm, system accessibility and academic year.

Moreover, the conclusions underline the usefulness of this research in the educational process at a practical level. The reported findings could help those who create or manage specific learning systems, since they provide important information as to whether students accept or not such systems and their intention for future use. For this reason, teachers and those engaged in the field of LMS should pay attention to factors related to the explanation of behavior and intention of such systems. In addition to the research findings, a usability evaluation was implemented that nowadays is needed in this type of systems, because they can contribute in a simple and quick way to their evaluation and to redevelopment to improve them. More explicitly, the use of such tools could be performed in short period of time, comparing usability of different systems or assessing the various systems which can serve as feedback to optimize the systems so as to be more appealing to the public targeted.

This study is not without limitations. The sample consisted of a single student population with certain characteristics. Thus, it could be a possibility that participants from other departments and from all universities in Greece can join for the expansion of the results tested and the applicability of the factors under investigation. It could also address other learning management systems and facilitate a comparison between them. Finally, these factors could be considered in relation to some characteristics of participants, e.g. using the Big Five Personality Test (Rothmann & Coetzser, 2003). However, a deeper understanding of all learners’ cognitive strategies and information processing behaviors is required to provide a suitable information architecture that promotes the learning process (Tselios, Avouris, & Kordaki, 2002, Tselios, & Avouris, 2003, Katsanos, Tselios, & Avouris, 2008).

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