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Gender Differences in Acceptance by Students of Training Software for Office Tools

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Abstract

As learning method, distance learning (e-learning or e-training) became a current practice in several educational institutions. E-learning presents for learners numerous advantages: it facilitates access to the learning providing flexibility facing time and spatial constraints ; it improves understanding by using multimedia tools, so accelerating learning ; it personalizes learning according to preferences of each learner ; it allows a more precise and continuous individual supervision. However, e-learning success depends widely on adoption of tools by learners, which depends on a certain number of contextual factors.
Among the numerous researches on the adoption of the new information technologies, the Technology Acceptance Model is the one which was the most widely used. Both fundamental concepts of the TAM are, on the one hand, the perceived usefulness which translates the perceptions of the gains of performances to use the technology and, on the other hand, the perceived ease of use which translates the judgments of the efforts required to be able to use the technology. These two basic variables undergo the effect of external factors (individual, organizational and technological) and influence individual's attitude and intention towards IT.
The objective of this research is to study the students' adoption of an e-learning system. The research model is an adaptation of the Technology Acceptance Model 3 in the context of the study (learning environment). The research has resulted in a questionnaire distributed to 404 students in first year of a business school. Structural equation modeling is used as the main technique for data analysis. Overall, this study shows that the TAM has the predictive ability to explain the use of an e-learning system by students. In addition, the results show that there are some differences among female and male.

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Introduction

A recent trend in higher education has been to set up e-learning systems that provide students with online access and learning content. Many institutions that provide e-learning face important difficulty in achieving successful strategies, including the delivery, effectiveness, and acceptance of the courses (Saadé, 2003). Kilmurray (2003) notes that merely offering any conceivable course and attempting to replicate classroom experience online cannot meet the students' needs and may cause unexpected failure. Then, with the growing reliance on information systems and increasing rapidity of the introduction of new technologies into learning environment, identifying the critical factors related to user acceptance of technology continues to be an important issue (Yi & Hwang, 2003).

In technology acceptance research, the Technology Acceptance Model (TAM) (Davis, 1989) has been found to be a parsimonious model for explaining user behavior across a broad range of end-user computing technologies and user populations (Legris et al., 2003; Park, 2009; Teo, 2010). In the TAM, behavioral intention (BI) is posited to be influences by attitude towards usage (A), as well as the direct and indirect effects of perceived usefulness (PU) and perceived ease of use (PEOU). Both PU and PEOU jointly affect A, and PEOU has a direct impact on PU. This one refers to the extent which a person believes that using technology will enhance his/her productivity. In contrast, PEOU has to do with the extent to which a person thinks that using a system will be relatively free of effort. PEOU was hypothesis to have a significant direct effect on PU (Davis et al., 1989). PU is concerned with the expected overall impact of technology use on job performance (outcome), whereas PEOU pertains only to those performance impacts related to the process of using the technology per se (process).

In the background of adoption of information technologies, and particularly from the theoretical perspective of TAM, the literature recognizes that gender is a key element to understand the differences in perceptions of usefulness and ease of use (Venkatesh at al. 2003). Unfortunately, the effect of gender roles in TAM has been scarcely research (Ong & Lai, 2006; Arenas-Gaitan et al., 2010), even less in relation to e-learning platform. And as He & Freeman (2009) manifest, evidence of the effect of gender is far from conclusive. The lack of findings justifies the purpose of this work.

The objective of this research is to study the students' adoption of an e-learning system. First, a review of the literature about TAM and e-learning and gender and TAM is proposed. Second, we proposed a research model based on the TAM 3 to measure the acceptance and use of e-learning system. Third, the results of applying the Partial Least Squares (PLS) analysis to the TAM model on the entire sample, and the sub-sample of women and men are presented. ANOVA is used to compare construct measurement, and PLS multi-group analysis is used to compare differences between groups. Finally, the main conclusions are exposed.

Literature review

TAM and e-learning

Several authors have used TAM in educational settings (Saadé & Galloway 2005; Liu et al. 2005; Roca et al. 2006; Landry et al. 2006; Masrom, 2007; Zhang et al, 2008; Park, 2009). Landry et al.(2006) and Saadé & Galloway (2005) made use of TAM to measure student's acceptance of web-based e-learning tools. In both studies TAM was found to perform well with the main hypotheses being supported and a total variance in usage intentions explained with a little less than 40% (Saadé & Galloway 2005). Landry et al. (2006) found usage to be determined by the two TAM constructs perceived ease of use and perceived usefulness and could furthermore find support for the two dimensions suggested for perceived usefulness, namely perceived effectiveness and perceived importance. The relationship between university students' perceptions of ease of use and usage of Blackboard elements was fully

supported but varied at different levels. As originally hypothesized by Davis (1989); Landry's et al.(2006) findings suggest that if students perceive Blackboard to be easy to use, they would also perceive Blackboard to be useful. This could be confirmed also by Saade & Galloway (2005). Usefulness turned out to be the strongest determinant of usage intentions (Landry et al.. 2006).

In order to predict a user's acceptance behavior of e-learning Liu et al. (2005) developed a theoretical framework to explain students' intentions to an e-learning system using TAM and flow theory. Additional variables that were investigated are different presentation types (Text audio, Audio-video, Text-Audio-video) and concentration. Liu et al.(2005) found the difference in presentation types as well as concentration to have a significant impact on usage intentions.

Roca et al.(2006) investigate student's intention to continue using an e-learning system. As the focus is on continued use, a satisfaction construct is proposed. Roca et al.(2006) suggest that the impact of the two TAM variables perceived usefulness and perceived ease of use on continued use is mediated by the satisfaction. By making use of TPB (including behavioral control and subjective norm) as well as expectation disconfirmation theory (EDT), Roca et al. (2006) break down the component perceived performance into perceived quality and perceived usability and further propose the constructs information quality, confirmation, service quality, system quality and cognitive absorption as antecedents of satisfaction. Roca et al. (2006) found support for their proposed model, yet again, perceived usefulness turned out to be the strongest determinant.

Masrom (2007) studies student acceptance of e-learning technology. He shows that TAM is partially supported. Results shows that perceived usefulness is more important in determining intention to use than attitude toward using, that is in concordance with TAM. Contrary to what TAM hypothesizes, attitude is found to have no effect on intention to use. Masrom hypothesizes these might reflect limitations of TAM's applicability with respect to technologies, user populations, or both. For him, in comparison with prior TAM studies, his model appears to have relatively weaker utility for explaining students' attitude formation and intention development. TAM appears to lack adequate specificity to explain and enunciate attitude and intention of students. The results of this study show that TAM can be used to explain the students' acceptance of e-learning technology.

Zhang et al. (2008) include a motivational perspective into the TAM and postulate PU and enjoyment as the key drivers. The results show that perceived ease of use has a significant impact on learners' acceptance behavior towards using e-learning technology and helps students accept the importance of the system to their study performance. In addition, enjoyment is found to play an essential role as a predictor to behavioral intention which increases when a student enjoys interaction with the system. In addition, this study validates the perspective of intrinsic motivation to explain individuals' IT acceptance behavior. The results show that both types of motivation (extrinsic and intrinsic) significantly influence individual behavior.

Park (2009) uses the structural equation modeling technique to explain the adoption process. He develops a structural model, including external variables like e-learning self-efficacy, subjective norm, and system accessibility, based on the technology acceptance model. The results prove TAM to be a good theoretical tool to understand users' acceptance of e-learning. One of interesting results of the study is that both e-learning self-efficacy and subjective norm play an important role in affecting towards e-learning and behavioral intention to use e-learning. It confirms the results of Zhang et al. study. Indeed, e-learning may be considered an intrinsic motivational factor and subjective norm may be an extrinsic motivational factor.

Gender and TAM

The evidence about the effect of gender on the acceptance of information technology is not conclusive (Arenas-Gaitan et al., 2010). Results of previous studies show conflicting evidence in relation to whether gender affects or not the likelihood of using a particular computer

system. For example, Taylor (2004) indicates the existence of such effects, and on the contrary, Morris et al. (2005) indicate that these effects may disappear, especially in a young population.

In the e-learning environment, we find conflicting evidence too. In their study, Venkatesh & Morris (2000) find that the relation between PU and BI is stronger for men than for women. But, there is no difference between men and women on the relation between PEOU and PU. Cheung et al. (2002) replicate the study of Venkatesh & Morris and find substantially the same results. They conclude on the general applicability of the TAM and the existence of a gender impact on the model. Ong & Lai (2006) show that there is an evidence of gender related effects in the context of the adoption of e-learning. Men's scores on the PU, PEOU and BI to use e-learning are higher than scores of women. In addition PU influences BI to use e-learning more strongly for men than for women. And, similarly, PEOU influence the PU of e-learning more strongly in women than in men.

On the contrary, Arena-Gaitan et al. (2010) find that there are no statistically significant differences between men and women when adopting e-learning platform. They conclude that analyzing a sample of university students is a key point to explain this result. Students both men and women have equal educational technology in the classroom. Often, they have similar previous training, especially in the higher courses with a very similar experience as learners. So they have the same perceptions. Teo (2010) finds that there are no statistically differences in three paths: between A and BI, between PEOU and A, and between PEOU and PU. He shows that the men and women sample did not treat items in the scale differently.

Research model, hypothesis and methodology

We propose a model based on the TAM 3, including the basic constructs of TAM – perceived usefulness, perceived ease of use, behavioral intention, and use of the e-learning system. It also includes with four antecedents. First, result demonstrability (RES) and relevance (REL) precede PU, and secondly, computer anxiety (ANX), perceived enjoyment (ENJ) and computer playfulness (PLAY) precede PEOU. The research model and hypothesis are visualized in figure 1.

The hypotheses are:

- H1: perceived usefulness will have a positive effect on students' behavioral intention to use the e-learning system.
- H2: perceived ease of use will have a positive effect on students' behavioral intention to use the e-learning system.
- H3: perceived ease of use will have a positive effect on perceived usefulness.
- H4: behavioral intention will have a positive effect on students' use behavior.
- H5a: relevance (degree to which an individual believes that the target system is applicable to his or her job) will have a positive effect on perceived usefulness.
- H5b: result demonstrability (degree to which an individual believes that the results of using a system are tangible, observable, and communicable) will have a positive effect on perceived usefulness.
- H6a: computer anxiety (degree of an individual's apprehension, or even fear, when an individual is faced with the possibility of using computers) will have a negative effect on perceived ease of use.
- H6b: perceived enjoyment (extend to which the activity of using a specific system is perceived to be enjoyable in its own right) will have a positive effect on perceived ease of use.

- H6c: computer playfulness (degree of cognitive spontaneity in microcomputer interactions) will have a positive effect on perceived ease of use.
- H7: statistically significant differences between men and women exist in relationships between variables of the adoption of e-learning.

First year students at a French business school who have access to a particular virtual learning environment, called MediaPlus, built the sample for this investigation. MediaPlus is web based software for learning office tools (word processor, spreadsheet, presentation tool, and data bases).
Measurement scales of all items were obtained from prior studies (Venkatesh & Davis, 2000; Venkatesh & Bala, 2008). The constructs and their factors used in the questionnaire are in appendix A. All the items are measured by a 7-points Likert scale (1 for totally disagree, 7 for totally agree), except items about use (see appendix A).
For the study 422 questionnaires were distributed, 291 were completed and returned, showing a 69% response rate. All respondents had used MediaPlus before; the respondents are in majority 20 years old, 62,5 percent are female and 37,5 percent are male; all the respondents are French.
A multi-group analysis of the proposed model was applied using XLSTAT. Initially, the proposed model was validated for the whole sample (291 cases). Then the sample was divided in two groups: males (109 cases) and females (182 cases) to compare differences between groups. Before that, reliability and validity of the measurement model was analysed.

Results

Reliability is evaluated using Cronbach's alpha. The values are either close or above 0.7. Although the results are not as high as those obtained in some previous research using the same items (particularly for ease of use items), they are in range that is deemed acceptable, based on common threshold values recommended by the literature.
Correlation analysis and factor analysis evaluate the construct validity and discriminant validity of the instrument. Correlation is considerably higher among items intended for the same construct than among those designed to measure different constructs. All individual loads are superior at 0.6. This suggests sufficient convergent and discriminant validity of the measurements.
After analyzing validity and reliability of the measurement model, relationships between the constructs were addressed. Hypotheses were tested by examining path coefficients (β) and their significance. Figure 2 shows the result for the model considering the whole sample.
Results of PLS analysis for the model with the groups of males and females are shown in table 1. Based on these results H1, H3, H4, H5 are accepted, H6 is partially accepted, and H2 and H7 are rejected.

Conclusions

In conclusion, we highlight some main contributions of this study. First, a version of TAM model that includes elements of TAM3, to explain the process of adoption of e-learning in higher education in a French business high-school has been used successfully. This means we

can test another technology in the field of virtual education platform, helping to improve these educational techniques.

Secondly, the finding of a non significant relationship between perceived ease of use and behavioral intention to use is surprising. This is undoubtedly due to the fact that the use of the e-learning platform is mandatory. Thus, ease of use is of little interest to users.

Thirdly, contrary to previous literature (Arena-Gaetan et al., 2010), a non significant relationship between perceived enjoyment and perceived ease of use was found. We can assume that the interpretation of this result is the same than in the secondly.

Last, the study indicates no statistically significant differences between males and females when adopting e-learning platform according to the testing model. However, multigroup analysis holds some information differentiating between both genders. The relationship between behavioral intention and use is stronger among females. This suggests a greater willingness of women to a greater use of the e-learning system when behavior intention exists. By contrast, among the males of the sample are stronger all the other relationships. So the results of this study are not in line with the literature (Ong & Lai, 2006; Morris et al., 2005; Arena-Gaetan et al., 2010). According to Morris et al. (2005), we believe that analyzing a sample of high-school students (not employee) is a key element to explain these results. Indeed, both men and women have the same age, the same previous training and the same educational technology in the classroom. This may be one reason why gender inequality regarding the perception of technology does not appear among higher education students. Further research is necessary.

This study has two major limitations. First, the study is cross sectional, a longitudinal study would be advisable to compare the different stages of adoption of e-learning. Secondly, it would be useful to incorporate more students from other area different of management studies, such as engineering, exact science or other social sciences and humanities.

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Figures and tables

Figure 1. Research model

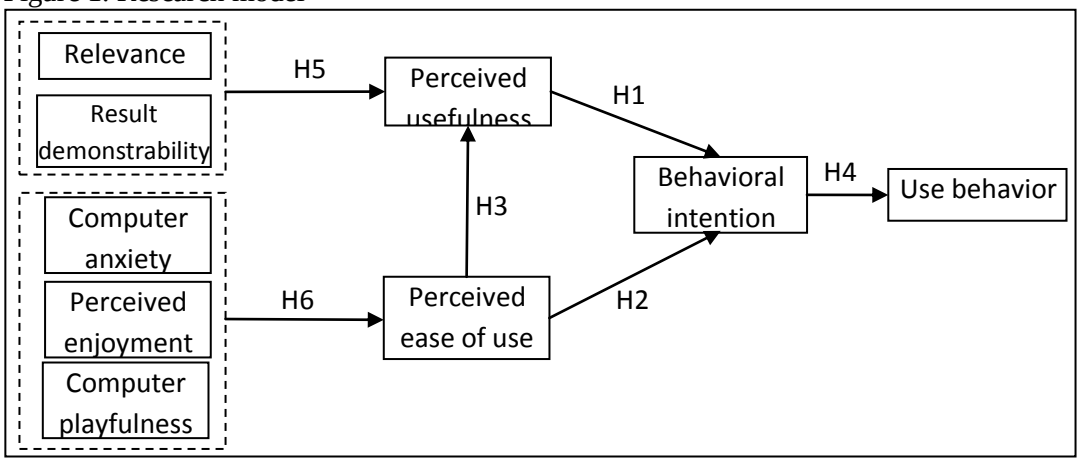

Figure 2. PLS results for the whole sample

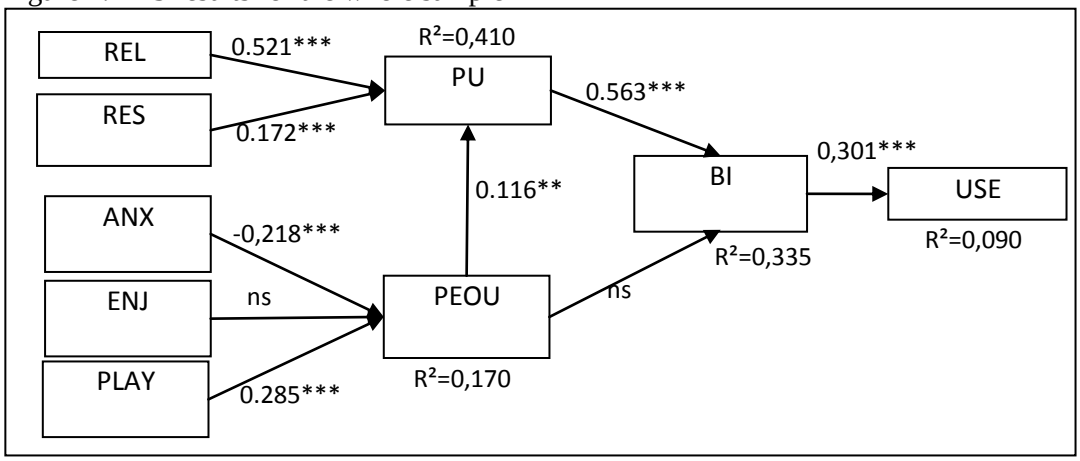

Table 1. Path coefficients

Path	Males	Sig	Females	Sig	t-spooled	Sig
REL->PU	0,517	***	0,507	***	0,091	ns
RES->PU	0,234	***	0,137	**	0,925	ns
ANX->PEOU	-0,245	**	-0,212	**	0,033	ns
ENJ->PEOU	0,192	*	ns		1,481	ns
PLAY->PEOU	0,281	***	0,287	***	0,048	ns
PEOU->PU	0,138	*	0,115	*	0,237	ns
PU->BI	0,623	***	0,521	***	1,022	ns
PEOU->BI	ns		ns			ns
BI->USE	0,284	***	0,320	***	0,379	ns

Appendix A

Constructs		Items
Relevance	REL1	In my job, usage of the system is important.
	REL2	In my job, usage of the system is pertinent.
	REL3	The use of the system is pertinent to my various job-related tasks
Result demonstrability	RES1	I have no difficulty telling others about the results of using the system.
	RES2	I believe I could communicate to others the consequences of using the system.
	RES3	The results of using the system are apparent to me.
	RES4	I would have difficulty explaining why using the system may or may not be beneficial.
Perceived enjoyment	ENJ1	I find using the system to be enjoyable.
	ENJ2	The actual process of using the system is pleasant.
	ENJ3	I have fun using the system.
Computer anxiety	ANX1	Computers do not scare me at all.
	ANX2	Working with a computer makes me nervous.
	ANX3	Computers make me feel uncomfortable.
	ANX4	Computers make me feel uneasy.
Computer playfulness		The following questions ask you how you would characterize yourself when you use computers
	PLA1	…spontaneous.
	PLA2	…creative.
	PLA3	…playful.
	PLA4	…unoriginal.
Perceived usefulness	PU1	Using the system improves my performance in my job.
	PU2	Using the system in my job increases my productivity.
	PU3	Using the system enhances my effectiveness in my job.
	PU4	I find the system to be useful in my job.
Perceived ease of use	PEOU1	My interaction with the system is clear and understandable.
	PEOU2	Interacting with the system does not require a lot of my mental effort.
	PEOU3	I find the system to be easy to use.
	PEOU4	I find it easy to get the system to do what I want it to do.
Behavioral intention	BI1	Assuming I had access to the system, I intend to use it.
	BI2	Given that I had access to the system, I predict that I would use it.
	BI3	I plan to use the system in the next <n> months.
Use	USE1	What is your frequency use of the system? (1 a lot of; 2 less than once per week; 3 once per week; 4 several times per week; 5 once per day; 6 several times per day)
	USE2	On average, how much time do you spend on the system each week?