Investigating the Antecedents of Continuance Intention of Course Management Systems Use among Estonian Undergraduates

Princely Ifinedo, Cape Breton University, Canada

ABSTRACT

This study examines the factors influencing Estonian college student retention in course management systems (CMS). The study employed a sample of 72 students with experience in CMS tools, that is WebCT. The participants came from four local higher education institutions. A hypothetical, structural model highlighting the impact of relevant antecedents such as, ease of finding, computer anxiety, self-efficacy, perceived usefulness, and perceived ease of use were developed. Twelve hypotheses were generated from the model and tested using a structural equation modeling technique, partial least squares (PLS). The predictive power of the model was adequate and the study found support for seven of 12 hypotheses. Regarding the impact of the antecedents on continuance intention in the use of technology, the results offer the following insights: when computer anxiety is low, students are able to use the system without much difficulty, and are likely to continue to use it in the future. Similarly, students intent to continue the use WebCT is enhanced when they are able to navigate the system with ease. The implications of the results are discussed.

Keywords: *continuance intention; course management systems; electronic learning; technology acceptance model; user characteristics; Web-based education; WebCT*

INTRODUCTION

Currently, higher learning institutions across the globe have started adopting a type of information and communication technology (ICT), generally referred to as course management systems (CMS) to enhance pedagogy (Limayem, Chan & Chan, 2003; Ifinedo, 2006; Ngai et al., 2007; Tavangarian et al., 2004). CMS are used in the management of asynchronous academic environments (Tavangarian et al., 2004). Examples of CMS include Blackboard, Learning Space, and WebCT (the example used in this study). In brief, the technology or tools enable students to learn at their own speed, and give and receive feedback from peers and instructors alike. Additionally, it provides a wide variety of learning and teaching opportunities, such as course content and syllabi tools, student

progress tracking, group project organization, student self-evaluation, e-mail, and online chat. Morss (1999) studied the relevance of WebCT in higher learning settings noting that students generally have favourable attitudes towards the tool. This is due to the fact that WebCT is easy to use and requires little or no technical background (see Ifinedo, 2006).

Several thousands of universities around the world have adopted WebCT to enhance their e-learning platforms (Ifinedo, 2005b, 2006; Ngai et al., 2007; Tavangarian et al., 2004). The same is true for higher learning institutions in Estonia, where CMS, including WebCT, have been adopted to facilitate Web-based learning or e-learning (Ifinedo, 2005a). Estonia is an emerging country in Eastern Europe incorporating ICT use in education at levels (Estonian eUniversity, 2004a; Tiger Leap Foundation, 1997). Therefore, Estonian colleges were chosen as a model to test the efficacy of Web-based learning. Researchers (e.g., Morss, 1999; Limayem et al., 2003; Ngai et al., 2007; Tavangarian e et al., 2004) have studied the acceptance of CMS among college students in developed countries. Results suggest that the acceptance and success with such tools are high. Unfortunately, a search of relevant literature shows little or no empirical studies exist in which the Estonian student's perspectives have been discussed. Success in the use and acceptance of these technologies among students in developed countries does not necessarily represent the attitudes of students from other regions of the world (Brown, 2007). Conflicting results could be due to cultural and socio-economic differences (Gefen & Straub, 2000; Straub et al., 1995). It is hoped that by studying the perceptions of Estonian student intent to continue the use of WebCT, policy makers and e-learning project administrators in the country will benefit from the results of this study.

Importantly, this study complements other research in Estonia examining e-learning project success assessment. For example, Ifinedo (2005a) reports the risks of implementing e-learning projects from the information systems (IS) project managers' point of view. The Estonian eUniversity (2004b) conducted a survey to determine the needs of e-studies and e-learning environments among teachers in the country. In both studies, the views of students' were not sought. Indeed, Keller and Cernerud (2002) note that the discourse of ICT use in pedagogy tends to focus on how faculty members use such technologies, with little or no attention paid to students' perspectives on these issues. They argue that by researching students' views, we stand to increase our knowledge in the success of learning environment. More importantly, e-learning project managers and other policy makers in Estonia, as elsewhere, are beginning to realize that as new ICT are introduced, if administrators are not educated in the success of these learning strategies, a valuable resource may be lost (Davis, 1989; Gefen & Straub, 2000; Lee et al., 2003; Estonian eUniversity, 2004b; Straub et al., 1995). The notion of acceptance in this article refers to "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support" (Dillon & Morris, 1996, p.4).

This present study is motivated by the lack of empirical studies on WebCT continuance intention of use among college students. Additionally, this research aims at presenting empirical evidence from a region of the world that has not been featured prominently in the literature. Importantly, this research did not limit its scope to presenting evidence on WebCT use as the major indicator for success with the tool. Previous studies were limited by an approach using only WebCT to measure success with the technology acceptance model (TAM). Such studies overlook the fact that use is the first step in achieving success with the new IS. In fact, Bhattacherjee (2001) and Limayem et al. (2003) have argued for IS continuance intention to be incorporated into studies investigating the adoption of IS. This will assure overall success with IS acceptance. Similarly, Davis (1989) argues the predictive capability of TAM could be improved when relevant variables or factors are considered. In response, researchers examining the acceptance

of technologies have heeded the warning made by Davis (1989) by incorporating the influence of a variety of external factors (see Brown, 2002; Lee et al., 2003; Ifinedo, 2006; Ngai et al., 2007; Venkatesh & Davis, 1994). In the context of e-learning technologies, *computer anxiety*, *ease of finding*, *ease of understanding*, and *self-efficacy* are among the external influences that have been used to increase the predictive power of TAM. Therefore, the choices made for this study reflect the need to enhance the predictability of TAM. Specifically, the study's objectives are as follows:

- To develop a hypothetical model comprising such factors as *ease of understanding, ease of finding*, *self-efficacy, computer anxiety*, and *continuance intention* use of WebCT among Estonian undergraduates,
- To test the predictive power of the structural model
- To determine the causality among the foregoing constructs or factors

The remainder of the article is organized as follows. The next section presents a review of the background literature. This is followed by the development of the relevant hypotheses. Next the research methodology is discussed. Afterwards, the data analysis is presented. The article ends with a discussion and conclusion section.

THEORETICAL BACKGROUND

The technology acceptance model (TAM) is regarded as the most widely used theoretical framework for assessing the acceptance of technologies in the literature (see Legris et al., 2003). The TAM was developed by Davis (1989) who drew from the theory of reasoned action (TRA) proposed by Fishbein and Ajzen (1975). The TAM proposes that users' acceptance of a new IS can be predicted by the users' perceptions. These perceptions include the ease of use and usefulness of the IS (Davis, 1989). The three core constructs in TAM include *perceived ease of use, perceived usefulness*, and *usage*. The *perceived ease of use* describes "The degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). *Perceived usefulness* describes the user's perceptions of the expected benefits derived from using a particular IS system (Davis, 1989). *Usage* is the dependent variable in TAM, and it is "theorized to be influenced by perceived usefulness and perceived ease of use" (Ibid, p 320). In brief, *perceived usefulness* mediates the effect of *perceived ease of use* on *usage* and at the same time, both directly influence *usage* (Davis, 1989). Although the relationships among the TAM constructs have yielded consistent results in the literature (Igbaria et al. 1997; Legris et al., 2003; Straub et al., 1995; Szajna, 1996), some conflicting outcomes have also been reported (see Anandarajan et al., 2002; Brown, 2002; Hu et al., 1999; Pan et al., 2003). For example, Hu et al. (1999) reported *perceived usefulness* as a significant determinant of *usage*, a result that is inconsistent with findings in Anandarajan et al. (2002) and Brown (2002). The latter studies demonstrated that *perceived ease of use* was the construct that best predicts the use of ICT.

Furthermore, some commentators, including Davis (1989), have argued that for future technology acceptance to be fully appreciated, the impact of relevant variables needs to be integrated into future research. Perhaps as a result of the limitations in TAM, others (e.g., Brown, 2002; Igbaria, 1990; Lee et al., 2003; Ngai et al., 2007; Steer et al., 2000; Venkatesh & Davis, 1994) have re-modeled TAM to include influences from external factors or variables. Steer et al. (2000) used TAM in Web-based environments to study usage behavior and concluded that a wider range of factors are needed to understand the user's adoption actions. Similarly, previous studies examining the acceptance of e-learning technologies among students have incorporated such factors as *computer anxiety*, *ease of finding*, *ease of understanding*, and *self-efficacy*, among others, to increase the predictive power of TAM (Brown, 2002; Ifinedo, 2006; Lee et al., 2003; Pan et al., 2003). At this juncture, we ask: Can a hypothetical model that incorporates TAM and

the other foregoing factors be developed to help us understand the future acceptance of IS (in this case WebCT)? First, we need to familiarize ourselves with some of these concepts.

The development of CMS, in general and WebCT, in particular is closely linked to the Internet (and the Web) (Ifinedo, 2006; Hsu et al., 2006; Lu et al., 2005; Morss, 1999;). The ability to navigate through Web-based media directly influences how users of such facilities perceive the usefulness, ease of use and success of such applications (e.g., Hara & Kling, 1999; Hsu et al., 2006; Lu et al., 2005). It goes without saying that those who are able to successfully navigate, to find and understand such media are more satisfied than those who are unable to do so (Hsu et al., 2006; Lederer et al., 2000; Lu et al., 2005). In fact, Lederer et al. (2000) noted that *ease of find*ing and *ease of understanding* are important variables that significantly predict the use of Web-based facilities. In the context of CMS acceptance among students, Brown (2002) and Ifinedo (2006) revealed that these variables positively influence WebCT use through *perceived usefulness* and *perceived ease of use*. That said, *computer anxiety* describes "the tendency of individuals to be uneasy, apprehensive, or fearful about current or future use of computers" (Igbaria & Parasuraman 1989, p. 375). The literature shows that *computer anxiety* influences IS acceptance (Compeau & Higgins, 1995; Igbaria, 1990; Igbaria & Parasuraman 1989). *Self-efficacy* is yet another important external variable that has been modeled in TAM studies (see Brown, 2002; Venkatesh & Davis, 1994; Pan et al., 2003). Among the first IS researchers to relate this concept to IS acceptance were Venkatesh and Davis (1994) who drew from the work of Bandura (1977). Morris and Turner (2001, p. 882) comments "people who believe they are capable of using IT to accomplish their tasks are more likely to use IT than those who do not share similar self-efficacy beliefs."

As briefly discussed previously, use only of new IS, though vitally important in enhancing acceptance, may be insufficient in ensuring the overall success of the IS. Bhattacherjee (2001) and Limayem et al. (2003) assert that long term success in enhanced IS continuance intention should not be overlooked. Bhattacherjee (2001) proposes the post acceptance model (PAM), which borrows from the expectation-confirmation theory in consumer behavior. The PAM suggests that the user forms an initial expectation of an IS prior to its use, then he or she accepts and uses the IS or rejects and does not use the IS. Afterwards, he or she develops perceptions about the IS (i.e., perceived usefulness). The user then assesses his or her original expectations, from which they determine a level of satisfaction. Finally, a satisfied user forms an IS *continuance intention*, while a dissatisfied user may discontinue the use of the IS. In the development of a hypothetical model that incorporates the concepts discussed above, this paper draws from the work of Pan et al. (2003). A framework that included a set of factors divided into exogenous, endogenous, and dependent variables were used in the discourse of students' attitudes towards Web-based learning environments. The model includes *self-efficacy* and TAM, with the dependent variable being *usage*. Thus, a hypothetical model is developed to include all the relevant concepts discussed herein (Figure 1).

Hypotheses

Twelve hypothesized paths are evaluated in this paper and illustrated in Figure 2. The statements of hypotheses are presented in the following paragraphs.

There is evidence to suggest that perceived ease of use of a website is strongly correlated with the ease with which information is accessed and understood (Ledera et al., 2000). The same appears to be true for e-learning Websites (Lu et al., 2005) and CMS (e.g., Brown, 2002; Ifinedo, 2006). Indeed, results in Ifinedo (2006) showed that students who have no difficulty in finding and understanding information on WebCT do view the system as easy to use, and may have a high regard for the system's usefulness. Thus, it can be hypothesized that:

Figure 1. The hypothetical model comprising relevant components

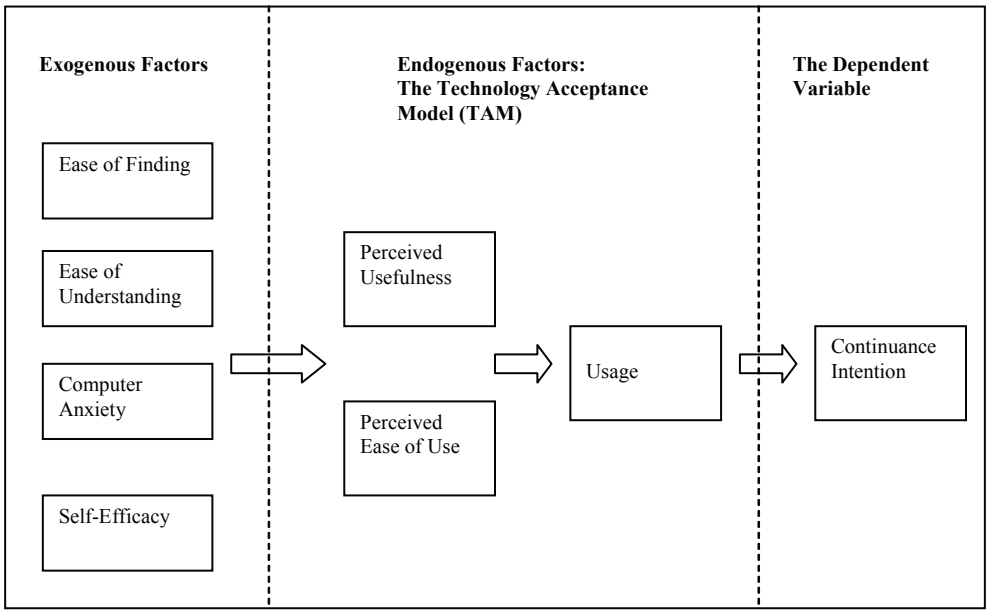
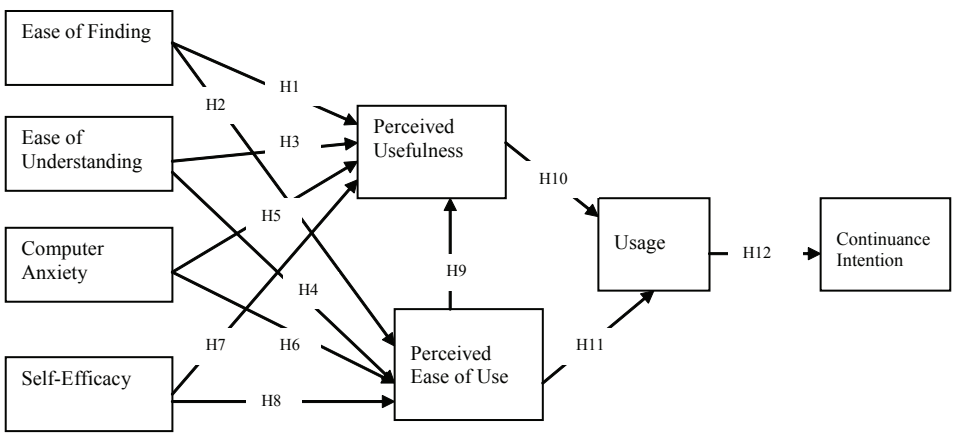


Figure 2. The research model with the hypotheses



H1: Ease of finding is positively related to perceived usefulness of WebCT.
H2: Ease of finding is positively related to perceived ease of use of WebCT.
H3: Ease of understanding is positively related to perceived usefulness of WebCT.
H4: Ease of understanding is positively related to perceived ease of use of WebCT.

Igbaria and Parasuraman (1989) and Igbaria (1990) found that IS acceptance is influenced by computer anxiety. This is congruent with the findings in Compeau and Higgins (1995). In the context of CMS acceptance among students, Brown (2002) and Ifinedo (2006) reported that a strong relationship exists between computer anxiety, on the one hand, and perceived useful-

ness and perceived ease of use, on the other. Thus, it can be hypothesized that:

H5: Computer anxiety has a positive effect on perceived usefulness of WebCT.
H6: Computer anxiety has a positive effect on perceived ease of use of WebCT.

Venkatesh and Davis (1994) provided evidence suggesting that self-efficacy is positively related to IS acceptance. Others such as Compeau and Higgins (1995), Morris (2001), and Lee and Witta (2001) have also reported findings that affirm such a relationship. Researchers including Brown (2002), Pan et al. (2003), and Ifinedo (2006) examining the acceptance of WebCT among students, have also observed that students who are comfortable in e-learning environments, where such a tool have been implemented, tend to have a high regard for its usefulness and ease of use compared to those with less self-efficacy attitudes. Thus, it can be hypothesized that:

H7: Self-efficacy has a positive effect on perceived usefulness of WebCT.
H8: Self-efficacy has a positive effect on perceived ease of use of WebCT.

With regard to IS acceptance, *Perceived usefulness* mediates the effect of *perceived ease of use* on *usage*. In fact, Davis (1989) demonstrated that *perceived ease of use* and *perceive usefulness* have positive effects on use of an IS. Evidence from differing sources have supported TAM (Igbaria, 1990; Straub et al., 1995; Venkatesh & Davis, 1994). It is also important to mention here that conflicting results have surfaced in some studies using the TAM model to understand technology acceptance (e.g., Brown, 2002; Hu et al., 1999; Pan et al., 2003; Straub et al., 1995). Nonetheless, in the face of the overwhelming evidence providing support for the nature of the relationships in TAM, this study proposes the following set of hypotheses:

H9: Perceived ease of use has a positive effect on perceived usefulness of WebCT.
H10: Perceived ease of use has a positive effect WebCT usage.
H11: Perceived usefulness of has a positive effect on WebCT usage.

The attitude of an IS user towards the systems impact his or her continuance intention (Bhattacherjee, 2001). The results from studies by Limayem et al. (2003), Sørebø (2004), Ifinedo (2006), and Roca et al. (2006) have shown that favourable perceptions of the ease of use and usefulness of CMS influence the continuance intention among users. Thus, it can be hypothesized that:

H12: WebCT usage has a positive effect on continuance intention.

RESEARCH METHODOLOGY

Research Method

This research used a convenient sample size of 72 students to obtain data from four tertiary institutions in Estonia including The Estonian Business School, Tallinn University of Technology, Tartu University and Estonian IT College. The four universities are among the well-attended schools in the country, and have students that have had experience with CMS, including WebCT (Ifinedo, 2005b). This study employed the judgmental sampling technique (Neuman, 1997). Following guidelines from the approach, a self-administered two-page questionnaire (please see the Appendix) was provided to students who indicated they had experience with WebCT. Participation was voluntary. The questionnaire was translated into Estonian in accordance with Brislin's (1986) suggestions for research conducted in a different culture. The questionnaire was test-piloted by four students whose comments helped to improve the quality of the final administered instrument. Students from diverse academic backgrounds were enlisted with the hope that such considerations would permit deeper insights. Accordingly, the study's participants included students from

Table 1. Demographic profile of the respondents

Variable		Number	Percent (%)
Gender	Male Female	32 40	44.4 55.6
Age	Less than 25 years 26-39 years	63 9	87.5 12.5
Education (level)	First year student Second year student Third year student Fourth year student	13 22 13 24	18.1 30.6 18.1 33.3
Study programme (Department)	Business / Economics studies Information Technology Mechanical Engineering Philosophy Electrical Engineering	36 16 9 6 5	50 22.2 12.5 8.3 6.9

the sciences, social sciences, and the arts and humanities. Their demographic profile is shown in Table 1.

Research Constructs

The questionnaire contained measures that had previously been validated in the literature. The scale for *ease of finding* (EAF) and *ease of understanding* (EOU) were comprised of three and five items, respectively. The measures were taken from the work of Lederer et al. (2000) and Brown (2002). *Self-efficacy* (SEF) and *computer anxiety* (CAX) had three (3) and four (4) items, respectively. These measures were adapted from Compeau and Higgins (1995) and Brown (2002). Four and three items from Davis (1989) were used to measure *perceived ease of use* (PEOU) and *perceived usefulness* (PUS), respectively. The *usage* (USG) construct was represented with two measures, which were taken from Davis (1989). Finally, *continuance intention* (CIX) was comprised of two items that originated with Bhattacherjee (2001) and Sørebø's (2004). All items were operationalized using a Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) with the exception of *usage*, which was assessed differently (see the Appendix). The composite reliabilities (similar to the Cronbach alphas) of the measures obtained in the data analysis are adequate and are consistently above the minimum value of 0.70 recommended by Nunnally (1978). See Table 2.

Data Analysis

A structural equation modeling (SEM) technique was used to examine the causal relationships among the constructs. SEM is a multivariate data analysis technique that contains mechanisms that eliminate measurement errors in the observed variables. There are two main approaches: PLS (partial least squares) and covariance-based SEM. The PLS approach is chosen for its capability to accommodate small-sized samples (Chin, 1998). Additionally, PLS recognizes two components of a casual model: the measurement model and the structural model. The measurement model consists of relationships among the factors of interest (i.e., the observed variables) and the measures underlying each construct. PLS demonstrates the construct validity of the research instrument (i.e., how well the instrument measures what it purports to measure). The two main dimensions

Table 2. Psychometric properties of measures and constructs

Construct	Item	Item loading	t-value	Composite reliability
Ease of finding (AVE = 0.848)	EAF1	0.8970	10.8426	0.943
	EAF2	0.9503	17.3738	
	EAF3	0.9140	14.5256	
Ease of understanding (AVE = 0.733)	EOU1	0.8152	6.9602	0.932
	EOU2	0.9221	11.4323	
	EOU3	0.9122	11.3962	
	EOU4	0.8662	9.2741	
	EOU5	0.7522	5.7313	
Self-efficacy (AVE = 0.838)	SEF1	0.8865	6.7685	0.939
	SEF2	0.9534	13.0258	
	SEF3	0.9051	8.3107	
Computer anxiety (AVE = 0.776)	CAX1	0.7867	5.6288	0.932
	CAX2	0.9290	11.5708	
	CAX3	0.9263	12.0673	
	CAX4	0.8736	8.9527	
Perceived ease of use (AVE = 0.733)	PEOU1	0.8082	11.4635	0.916
	PEOU2	0.8668	13.6675	
	PEOU3	0.8981	13.6231	
	PEOU4	0.8486	8.3175	
Perceived usefulness (AVE = 0.815)	PUS1	0.9018	16.9359	0.930
	PUS2	0.9368	19.5256	
	PUS3	0.8692	15.3670	
Usage (AVE = 0.914)	USG1	0.9513	36.2788	0.955
	USG2	0.9611	26.9078	
Continuance intention (AVE = 0.907)	CIX1	0.9611	14.4176	0.951
	CIX2	0.9439	21.2209	

are the convergent validity and the discriminant validity. The convergent validity (composite reliability) assesses the extent to which items on a scale are theoretically related; the loadings of variables are also noted.

On the other hand, the structural model provides information on how well the hypothesized relationships predict the theoretical model. PLS software, for example, PLS Graph 3.0, provides the squared multiple correlations (R^2) for each endogenous construct in the model and the path coefficients. The R^2 indicates the percentage of a construct's variance in the model while the path coefficients (β) indicate the strengths of relationships between constructs (Chin, 1998). Unlike other structural modeling software (e.g., LISREL), PLS Graph 3.0 does not generate a single goodness-of-fit metric for the entire

model. According to Chin (1998), both the **β** and the R^2 are sufficient for analysis, and **β** values between 0.20 and 0.30 yield meaningful interpretations.

Assessing the Measurement Model

Table 2 presents the Cronbach alphas, item loadings and composite reliabilities. Chin (1998) recommends item loadings of greater than 0.70. To determine if the measures are distinct and one dimensional, the discriminant validity is used. The square root of the average variance extracted (AVE), which provides a measure of the variance shared between a construct and its indicators for each construct is evaluated (Chin, 1998; Fornell & Larcker, 1981). These foregoing authors recommend AVE values of at least 0.50 and that the square root of AVE should be larger than off-diagonal elements (i.e., load highly on the measure it is intended to measure). The results in Table 3 indicate that in no case was any correlation between the constructs greater than the squared root of AVE (the leading diagonal). This suggests that the measures used in this study are distinct and one dimensional. Clearly, the convergent and discriminant validity of the study's data are psychometrically adequate.

Assessing the Structural Model

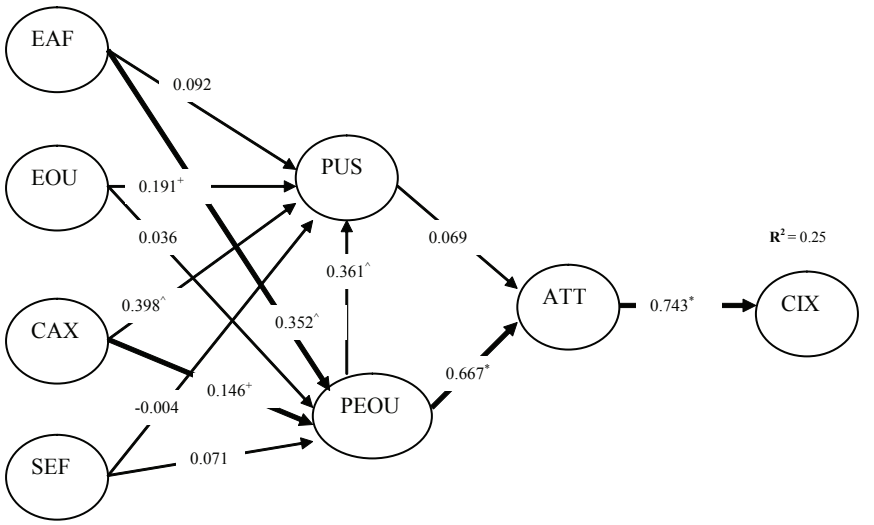
The paths coefficients (**β**) and the R^2 were generated by PLSGraph 3.0 and are shown in Figure 2. The constructs in the research model accounted for 25 percent of the variation in the model. Of note, the R^2 results compare with that of similar studies (see e.g., Gefen & Straub, 2000). The test of significance for all the paths was conducted using the bootstrap resampling procedure with 200 resamples. The results reveal no significant relationship exists between *ease of finding* and *perceived usefulness* (**β** = 0.092) (Figure 2). On the other hand, there was a strong relationship between the same construct, *ease of finding* and *perceived ease of use* (**β = 0**.352). Further, *ease of understanding* is strongly related to *perceived usefulness* (**β = 0.191**), but indicates no relationship with *perceive*d *ease of use* (**β = 0.036**). The results reveal that *computer anxiety* is positively related to both *perceived usefulness* (**β = 0.398**) and *perceived ease of use* (**β = 0.146**). The data did not show any positive relationships between *self-efficacy*, on the one hand, and *perceived usefulness* (**β = -0.004**) and *perceived ease of use* (**β = 0.071**), on the other. The data also show that *perceived ease of use* has a positive effect on *perceived usefulness* (**β = 0.361). All the exogenous factors account for 28 percent** of the variation of *perceived ease of use*. Similarly, 68 percent of the variation in the *perceived usefulness* construct is accounted for by **the exogenous factors and** *perceived ease of use.*

Further, PLS Graph 3.0 shows that *Perceived usefulness* has no effect on *usage* (**β = 0.069**); on the contrary, the other main variable

Table 3. Correlations of latent constructs and AVE

	AVE	EAF	EOU	SEF	CAX	PEOU	PUS	ATT	CIX
EAF	0.848	**0.921**							
EOU	0.733	0.669	**0.856**						
SEF	0.838	0.581	0.690	**0.915**					
CAX	0.776	0.635	0.480	0.562	**0.881**				
PEOU	0.733	0.509	0.390	0.382	0.426	**0.856**			
PUS	0.815	0.654	0.582	0.543	0.700	0.651	**0.903**		
USG	0.914	0.470	0.325	0.440	0.409	0.711	0.503	**0.956**	
CIX	0.907	0.553	0.430	0.494	0.488	0.546	0.555	0.742	**0.952**

Figure 3. The results of PLS graph 3.0 analysis



Legend:

*1. + = significant at 0.10 level, ^ significant at 0.05 level, * significant at 0.001 level.*

2. Bold arrows show the significant paths originating from the specified antecedents and terminating in the dependent variable

in TAM, *perceived ease of use* is shown to have a strong effect on *Usage* **(β = 0.667). Furthermore,** *usage* has a very strong positive effect on *continuance intention* **(β = 0.743). The preceding constructs, including the exogenous factors,** *perceived ease of use*, and *perceived usefulness* **explain 51 percent of the variation in WebCT** *usage***.** Together, the exogenous and endogenous variables account for 25 percent of the variation in the hypothetical model.

DISCUSSIONS AND CONCLUSION

This study developed a hypothetical model with relevant factors to evaluate the continuance intention use of CMS via WebCT among a group of Estonian students. The study major aim was to examine causality among the variables or factors in the proposed model. The choice of the selected factors included *ease of finding*, *computer anxiety*, and *perceived usefulness*, among others, as informed by their relevance and prominence in the IS acceptance literature. It is acknowledged that the chosen factors are offered as illustrative rather than exhaustive examples. Twelve hypotheses were developed to test the structural model. The data provides support for seven of the twelve hypotheses (i.e., H2, H3, H5, H6, H9, H11, and H12) and no support for five of the hypotheses (i.e., H1, H4, H7, H8, and H10). Table 4 provides a summary of the results.

As predicted, the results showed that *ease of finding* is positively related to *perceived ease of use.* This suggests that when students are able to navigate through WebCT's contents, their perception with regard to the ease of using such a system increases. From the results, it can be seen that when students have a high understanding of WebCT's contents, their perception of the system's usefulness tends to be high as well. These findings are consistent with others who have examined CMS acceptance among students (Brown, 2002; Ifinedo, 2006). Further, the data also show that when students' uneasiness and fear of using ICT, including computers and CMS is low, they tend to have higher perceptions regarding the ease of using

Table 4. Summary of the results and hypotheses

Hypothesis	path coefficient (β)	t-Value for path	Result
H1	0.092	0.8473	*Not Supported*
H2	0.352^	2.1309	Supported
H3	0.191+	1.8005	Supported
H4	0.036	0.2135	*Not Supported*
H5	0.398^	3.4744	Supported
H6	0.146+	0.9565	Supported
H7	-0.004	0.0344	*Not Supported*
H8	0.071	0.4600	*Not Supported*
H9	0.361^	3.3065	Supported
H10	0.069	0.5742	*Not Supported*
H11	0.667*	6.3676	Supported
H12	0.743*	11.5122	Supported

*+ = significant at 0.10 level, ^ significant at 0.05 level, * significant at 0.001 level.*

and the usefulness of such systems. Brown (2002) supports this viewpoint whereas Pan et al. (2003) do not.

Consistent with the majority of results in the literature about the causal relationships between the *perceived ease of use* and *perceived usefulness*, this study demonstrated that *perceived ease of use* is a mediating variable between *perceived usefulness* and *usage.* This can be interpreted to mean that when students are upbeat about using WebCT and similar technologies, they discover such systems are easy to use and subsequently the students can be expected to derive benefits from their efforts. However, this interpretation is open to debate. One may argue that students do not have a choice in how they adopt new technologies. The use of ICT, including e-learning tools, is usually not offered as a voluntary opportunity. More often than not, students are told how they will learn. Nevertheless, this result supports this aspect of TAM, and adds to the body of knowledge in this field. In other words, with respect to IS acceptance to research elements in Estonia (an emerging economy in Eastern Europe), the relationship between these two constructs is maintained.

With regard to the core of TAM, this study suggests the *perceived ease of use* of WebCT among Estonian college students is strongly related to *usage, w*hereas the effect of *perceived usefulness* on *usage* is unsupported. One possible explanation for this could be attributable to the non-voluntary nature of ICT adoption and acceptance in college settings. Another plausible explanation relates to the impact of contextual influences. Straub et al. (2000) suggested that some aspects of TAM, that is *perceived usefulness,* may be more important for IS acceptance in the developed West. Along a similar line of reasoning, other researchers, including Anandarajan et al (2002) and Brown (2002), have found evidence in support of *perceived ease of use* as a significant predictor of use (usage) for ICT products in developing countries. (Recall Estonia is an emerging economy in Eastern Europe). Rather than being taken as an inconsistent result, the analysis might be affirming a contextual reality. That said, the empirical data is suggesting that when the use of WebCT is high, the continuance intention of use will be high. This information corroborates the findings

in Limayem et al. (2003), Sørebø (2004), and Ifinedo (2006).

A closer look of the hypothetical model and the specific results (see the bold arrows in Figure 2), as regards how well the antecedents influence the *continuance intention* construct in terms of causality, the following insights can be offered: The paths beginning with *ease of finding* through *perceived ease of use* and *usage* are supported. Similarly, the paths originating from *computer anxiety* through *perceived ease of use* and *usage* are supported as well. This information supports suggesting to university administrators to procure funding for e-learning tools that students find easy to navigate (i.e., find information). When this is possible, students would use the system without effort and may continue to use it in the future. By the same token, administrators should guarantee that the implementation of such systems is done in manners to ensure that anxieties and fears among students are alleviated. The data analysis indicates the continuance intention of WebCT will be higher in such instances. The study also has implications for research: (1) This endeavour is among the few to propose a model of IS acceptance that goes beyond the initial usage phase, (2) The proposed framework could stimulate future inquiries as well as generate new leads for IS acceptance studies, (3) This research offers insights about CMS adoption and use from the perspective of students in a region that has not featured prominently in the literature, and (4) The findings of this study lend credence to other observations in the literature.

There are inherent limitations in this study. The research used a convenient sample size of 72; a larger sample size would yield a more robust data analysis and consequently more insightful results. This, however is not a major concern as the study used the PLS approach for data analysis. The selection of the research elements could be improved. For example, the study did not separate the students into broad categories; those from the "sciences" and "arts and humanities" separated into different groups. More useful insights may have emerged from individuals in different disciplines. For example, it is possible that views espoused by Engineering students are different those studying philosophy. Importantly, the sample may not be representative of all college students in the country. The measurement of WebCT usage was self-reported; and this might limit results. Actual usage of the system may offer better information (see Legris et al., 2003). This study is a cross-sectional study; a longitudinal study may be illuminating. As a result, the interpretations of the study's findings should be evaluated with care. To improve the generalizability of this effort, future studies could increase the sample size as well as incorporate the impacts of other relevant variables, including peer-pressure, age, gender, and facilitating conditions.

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REFERENCES

Anandarajan, M., Igbaria, M., & Anakwe, U. (2002). IT acceptance in a less-developed country: A motivational factor perspective. *International Journal of Information Management*, *22*, 47-65.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, *25*(3), 351-370.

Brown, I. (2002). Individual and technological factors affecting perceived ease of use of web-based learning technologies in a developing country. *Electronic Journal of Information Systems in Developing Countries*, *9*(5), 1-15.

Brislin, R. (1986).The wording and translation of research instruments. In W.J. Lonner, & J.W. Berry, (eds.), *Fields methods in cross-cultural*

research. Newbury Park, CA: Sage.

Chin, W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly*, *22*(1), vii-xvi.

Compeau, D., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-212.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–339.

Dillon, A., & Morris, M. G. (1996). User acceptance of information technology: Theories and models. *Annual Review of Information Science and Technology*, *31*, 3-32.

Estonian eUniversity (2004a). The UNIVe Project. Retrieved September 10, 2004 from http://www.e-uni.ee/Minerva/

Estonian eUniversity (2004b). Estonian e-University NEEDS Analysis. Retrieved May 5, 2004from, http://www.e-uni.ee/doc/uuring/E-ylikool_vajaduste_analyys_mp2.pdf

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, Mass: Addison-Wesley.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equations models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39-50.

Gefen, D., & Straub, D. (2000). The relative importance of perceived ease of use in the IS adoption: A study of e-commerce adoption. *Journal of Association for Information Systems*, *1*(8), 1-28.

Hara, N., & Kling, R. (1999). Students' frustrations with a web-based distance education, *First Monday*, 4, 12. Retrieved March 29, 2004, from http://www.firstmonday.org/issues/issue4_12/hara/index.html

Hsu, M.-H., Yen, C.-H., Chiu, C.-M.,& Chang, C.-M. (2006). A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior, *International Journal of Human-Computer Studies*, 64(9), 889-904.

Hu, P. J., Chau, P. Y. K., Sheng, O. R. L., & Tam, K. Y. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems*, *16*(2), 91-112.

Ifinedo, P. (2005a, September 12-15). E-learning technology adoption factors in an eastern european country: An exploratory study. In *Proceedings of the 9th East-European Conference on Advances in Databases and Information Systems*,Tallinn, Estonia.

Ifinedo, P. (2005b). Uncertainties and risks in the implementation of e-learning information systems project in a higher learning environment: Viewpoints from Estonia. *Journal of Information and Knowledge Management*, *4* (1), 37-46.

Ifinedo, P. (2006). Acceptance and continuance intention of web-based learning technologies (WLT) use among university students in a baltic country. *Electronic Journal of Information Systems in Developing Countries*, *23(*6), 1-20.

Igbaria, M. (1990). End-user computing effectiveness: A structural equation model. *Omega, 18*(6), 637-652.

Igbaria, M., & Parasuraman, S. (1989). A path analytic study of individual characteristics, computer anxiety, and attitudes toward microcomputers. *Journal of Management*, *15*(3), 373-388.

Keller, C., & Cernerud, L. (2002). Students' perceptions of e-learning in university education. *Journal of Educational Media*, *27*(1/2), 55-67.

Lee, C., & Witta, E. L. (2001). Online students' perceived self-efficacy: Does it change? *Annual meeting of the Association for Educational Communications and Technology (AECT)*, Atlanta, GA.

Lee, J, Cho, H., Gay, G., Davidson, B., & Ingraffea, A. (2003). Technology Acceptance and Social Networking in Distance Learning. *Educational Technology & Society*, *6*(2), 50-61.

Lederer, A., Maupin, D., Sena, M., & Zhuang, Y. (2000). The technology acceptance model and the world wide web. *Decision Support Systems*, *29*(3), 269-282.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology?: A

critical review of the technology acceptance model. *Information and Management*, *40*(3), 191-204.

Leidner, D. E., & Jarvenpaa, S. L (1993). The information age confronts education: Case studies on electronic classrooms. *Information Systems Research*, *4*(1), 24-54.

Limayem, M., Cheung, C. M. K., & Chan, G. W. W. (2003). Explaining information systems adoption and post-adoption: Towards an integrative model. *In Proceedings of 24th. International Conference on Information Systems,* 2003.

Liu, C., Lu, J., & Yu, C. (2003). Learning style, learning patterns, and learning performance in a WebCT-based MIS course. *Information and Management*, *40*(6), 497-507.

Lu, H-P, Liu, S-H., & Liao, H-L. (2005). Factors influencing the adoption of e-learning websites: An empirical study. *Issues in Information*, *6*(1), 190-196.

Morris, M.G., & Turner, J. M. (2001). Assessing users' subjective quality of experience with the world wide web: An exploratory examination of temporal changes in technology acceptance. *International Journal of Human-Computer Studies*, *54*(6), 877-901.

Morss, D. A. (1999). A study of student perspectives on web-based learning: WebCT in the classroom. *Internet Research: Electronic Network Applications and Policy*, *9*(5), 393-408.

Neuman, W. L. (1997). *Social research method*. London: Allyn and Bacon.

Ngai, E. W. T., Poon, J. K. L., & Chan, Y. H. C. (2006). Empirical examination of the adoption of WebCT using TAM. *Computer and Education*, *48*(2), 250-267.

Nunnally, J. C. (1978). *Psychometric theory.* New York, NY: McGraw-Hill.

Pan, C., Siva, S., & Brophy, J. (2003). Students' attitude in a web-enhanced hybrid course: A structural equation modeling inquiry. *Journal of Educational Media and Library Sciences*, *41*(2), 181-194.

Roca, J. C., Chiu, C-M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human-Computer Studies*, *64*(8), 683-696.

Straub, D., Limayem, M., & Karahanna, E. (1995). Measuring system usage: Implications for IS theory testing. *Management Science***,** *41*(8), 1328-1342.

Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. *Management Science***,** *42*(1), 85-92.

Sørebø, A. M. (2004). A replication of the post-acceptance model in the context of e-learning, *Proceedings of 2004 IRMA International Conference*, Louisiana, USA, 2004.

Steer, D., Turner, P., & Spencer, S. (2000). *Issues in adapting the technology acceptance model (TAM) to investigate non-workplace usage behavior on the world-wide-web.* School of Information Systems, Working Paper, University of Tasmania.

Tavangarian, D., Leypold, M. E., Nölting, K., Röser, K. M., & Voigt, D. (2004). Is e-learning the solution for individual learning? *Electronic Journal of E-Learning, 2*(2), 273-280.

Tiger Leap Foundation (1997). Retrieved September 3, 2007 from http://www.tiigrihype.ee/?op=&id=

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186-204.

APPENDIX: THE RESEARCH QUESTION

Table 1A.

Perceived ease of use (PEOU)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. WebCT is easy to use 2. WebCT is easy to learn 3. WebCT is user friendly 4. WebCT is easy to master							
Perceived usefulness (PUS)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. WebCT is useful for my studies 2. WebCT usages improves my academic performance 3. WebCT makes my studying easier.							
Ease of understanding (EOU)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. WebCT uses consistent terms 2. WebCT uses understandable terms. 3. WebCT display pages provide links to more detailed information. 4. WebCT displays a visually pleasing design 5. WebCT displays pages that are easy to read.							
Ease of finding (EAF)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. WebCT allows easy return to previous display pages. 2. I can determine my position within the WebCT program. 3. WebCT is easy to navigate.							
Self-efficacy (SEF)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. I would feel comfortable using WebCT on my own. 2. If I wanted I could easily use any of the functions in WebCT. 3. I would be able to use WebCT even if there is no one around to show me how to use it.							

Table continued on following page

Table 1A. continued

Computer Anxiety (CAX) (Reversed coding)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. Working with a computer makes me nervous. 2. Computers make me feel uncomfortable. 3. Computers make me feel uneasy. 4. Computers scare me.							

Please answer the following with regard to your WebCT use.

Intention to use (USG1)	1	2	3	4	5	6
On an average working day that you use WebCT, how much time do you spend on the system?	almost never	< ½ hr	½ - 1 hr	1-2 hrs	2-3 hrs	> 3 hrs

(USG2) On average (for the period that you were using WebCT), how frequently do you use it?	1 once a month	2 a few times a month	3 a few times a week	4 about once a day	5 several times a day	

Continuance Intention (CIX)	Strongly Disagree 1	Disagree 2	Somewhat disagree 3	Neutral 4	Somewhat Agree 5	Agree 6	Strongly Agree 7
1. I intend to continue to using WebCT rather than discontinue its use							
2. My intentions are to continue my use of WebCT rather than use alternative means							

Demographic information

Faculty/department of study:_____

Occupation:_____

Year of study:_____

Please tick your appropriate *age* group box:

≤ 25 years 26 – 39 years 40 - 55 years 56 – 67 years

What is your gender?: male female

Princely Ifinedo is an assistant professor at the Shannon School of Business, Cape Breton University, Canada. He earned his PhD in information systems science from the University of Jyväskylä, Finland. He also holds an MBA in international management from Royal Holloway College, University of London, the UK, a MSc in Informatics from Tallinn University of Technology, Estonia and a BSc in mathematics/computer science from the University of Port-Harcourt, Nigeria. His current research interests include e-learning, Web-based education, ERP success measurement, IT/business alignment, and the diffusion of IS/IT in transiting and developing economies. He has presented at various international IS conferences and his works have appeared (and are scheduled to appear) in such journals as Journal of Computer Information Systems, Enterprise Information Systems, Electronic Government: an International Journal, Journal of Information Technology Management, *and* Journal of Global Information Technology Management.