Development and Validation of a Model to Investigate the Impact of Individual Factors on Instructors' Intention to Use E-learning Systems

Bilquis Ferdousi
Spartanburg Community College, Spartanburg, South Carolina, USA
ferdousib@gmail.com

Yair Levy
Nova Southeastern University, Fort Lauderdale, Florida, USA
levyy@nova.edu

Abstract

E-learning is becoming an increasingly important part of higher education institutions. However, instructors' use of e-learning systems in community colleges in the United States is relatively sparse. Thus, the purpose of this study was to investigate some individual factors that may affect instructors' intention to use e-learning systems in community colleges. In this study, we proposed a theoretical model predicting instructors' intention to use e-learning systems in community colleges based on their resistance to change, perceived value of e-learning systems, computer self-efficacy, and attitude toward e-learning systems. The sample for this study included 119 (over 41% response rate) full-time, part-time, and adjunct instructors in different academic departments at a community college. Our findings indicate that the theoretical model developed was able to predict instructors' intention to use e-learning systems. All four predictive variables have significant effects on intention to use e-learning systems. Two statistical methods were used to formulate and test predictive models: Multiple Linear Regression (MLR) and Ordinal Logistic Regression (OLR). Results of both models were consistent on resistance to change as having the greatest weight on predicting instructors' intention to use e-learning systems, while computer self-efficacy in both analyses was found to have the least weight. We conclude the paper with a discussion, which includes a summary of the results, limitations of this research study, as well as implications for practice and future research.

Keywords: E-learning systems, Resistance to change, Perceived value, Computer self-efficacy, Attitude, Intention to use, Information systems use, Instructor, Higher education institution, Community college.

Introduction

E-learning is becoming an increasingly important part of Higher Education Institutions (HEI) (Ngai, Poon, & Chan, 2007). According to Allen and Seaman (2006), HEIs in the United States have been consistently at the forefront of e-learning course offerings. To offer e-learning courses, HEIs are investing substantial resources to incorporate and maintain the infrastructure of e-learning

Editor: Keith Harman

systems (Levy & Murphy, 2002; Yohon, Zimmerman, & Keeler, 2004). However, instructors' use of e-learning systems in community colleges in the United States is relatively sparse (Nevill & Zimbler, 2006). Changes in instructors' attitude toward e-learning systems have not kept pace with the way that e-learning systems have expanded in HEIs (J. K. Kim & Bonk, 2006; Zywno, 2002). While some instructors accept e-learning systems quickly and use such systems enthusiastically, a large number of instructors seem to lack the intention to accept such systems and continue to resist using them (Naidu, 2004). The resisting instructors far outnumber those who embrace and use e-learning systems (Lammers & Murphy, 2003; Zywno, 2002). The following section includes a review of the literature that outlines the key factors related to instructors' use of e-learning systems. Then, the research model is proposed followed by a review of the methodology used in our study. The results of the research and discussion of these results in the context of their contribution to practice and future research are provided.

Theoretical Background

E-Learning Systems

The concept of e-learning has been around since the early 1990s and is one of the most significant developments in the information technology (IT) industry's contribution to education (Selim, 2007). According to Fuller, Vician, and Brown (2006), researchers have been examining the role of IT as an instruction tool for over three decades. A number of individual characteristics have been identified as significant to the acceptance and subsequent use of IT. Gwebu and Wang (2007) suggested that with their increasing popularity and strategic importance, e-learning systems have received ample attention both from practitioners and scholars. According to Selim (2007), as with all educational endeavors, instructors play a central role in the effectiveness and success of e-learning courses. Consequently, understanding individual determinants in the acceptance of e-learning systems by instructors is highly warranted.

Referring to the definition of e-learning systems given by the Learning Technology Standard Committee of the Institute of Electrical and Electronics Engineers (IEEE), Ngai et al. (2007) stated that an e-learning system is:

> *a learning technology system that uses Web-browsers as the primary means of interaction with learners, and Internet or an intranet as the primary means of communication among its subsystems and with other systems. These systems work as platform to facilitate teaching and learning. (p. 252)*

Ngai et al. noted that, with the widespread use of the Web, many HEIs are taking the opportunity to develop e-learning courses. As a result, e-learning systems are becoming an increasingly important part of HEIs. Numerous HEIs are now resorting to e-learning systems as teaching and learning tools for enhancing authentic e-learning (Liaw, Huang, & Chen, 2007). According to Mahdizadeh, Biemans, and Mulder (2007), e-learning systems increasingly serve important infrastructural features that enable university instructors to provide students with different representations of knowledge and to enhance interaction between instructors and students and amongst students themselves. Although there have been rapid advances in computer hardware and software capabilities, the problem of underutilized e-learning systems still remains and this underutilization appears to be more acute at community colleges (J. K. Kim & Bonk, 2006). Thus, this study was specifically designed to look at factors that may hinder instructors' intentions to use e-learning systems as part of their educational delivery portfolio.

Theories on Intention to Use and Actual Use of IT

In the domain of information systems (IS), the issue of acceptance of IT has been discussed using different theoretical models (Selim, 2003). Research in this area has resulted in several theoretical models, with roots in IS, psychology, and sociology, that routinely explain over 40% of the variance in individuals' use of new IT (Venkatesh, Morris, Davis, & Davis, 2003). This body of literature includes Ajzen and Fishbein's (1980) Theory of Reasoned Action (TRA), Ajzen's (1985) Theory of Planned Behavior (TPB), Bandura's (1986) Social Cognitive Theory (SCT), Rogers' (1995) Diffusion of Innovation Theory (DIT), and Davis' (1989) classical Technology Acceptance Model (TAM). In all instances, great effort has been made in order to understand the antecedent factors that influence individuals' use of IT (Limayem & Hirt, 2003). Based on these theoretical models, numerous studies focused on the individual factors that contribute to individuals' use of new technology in organizations (Venkatesh et al., 2003).

According to Premkumar and Bhattacherjee (2004), use of IT is a key dependant variable in IS research, and intention to use is a valid predictor of actual use of IT (Sun, 2003). There is a documented impact of intention to use on actual use of IT (Greer & Murtaza, 2003), and intention is considered to be the best predictor of actual behavior (Agarwal & Karahanna, 2000). Davis, Bagozzi, & Warshaw (1989) argued that individuals' use of IT can be predicted reasonably well from their intention to use IT. That is, any factor that affects use of IT is indirectly influenced through intention to use IT. According to Venkatesh et al. (2003), intention to use IT has direct effect on the use of IT. Ajzen (2001) noted that intention plays an important role in guiding human behavior, and relatively stable intention is a better predictor of subsequent behavior. Thus, the intention to use is the primary antecedent of actual use. Following this prior evidence, it can be assumed that instructors' intention to use e-learning systems is a valid predictor of instructors' actual use of e-learning systems. Consequently, this study examined the individual factors that affect instructors' intention to use e-learning systems. Instructors' actual use of e-learning systems was not investigated in this study as we also attempted to investigate such factors with participants who are not currently using e-learning systems.

Resistance to Change

In IS literature, resistance to change has been identified as one of the possible determinants that affect the use of IT (Klaus, Wingreen, & Blanton, 2007). According to Klaus et al. (2007), resistance to change is one important cause of failure of more than half of IT projects in organizations. According to Markus (1983), explanation of resistance to change is important because resistance guides individuals' use of IT and influences the IT implementation in organizations. Hultman (2003) defined resistance as "a state of mind reflecting unwillingness or unreceptiveness to change in the ways people think or behave" (p. 693). Similarly, resistance to IT is behavior intended to prevent the implementation and/or use of an IT. Badu-Nyarko (2006) noted that instructors often appeared resistant to change; hence, they were unfavorable to innovation and accepting new technology. Thus, we attempted to investigate if instructors' resistance to change may create a negative contribution to their intention to use e-learning systems**.**

Perceived Value of E-Learning Systems

Compeau and Higgins (1995) suggested that individuals would use IT if they could see that there would be positive value associated with such use. In Bandura's (1986) SCT, individuals are more likely to undertake behaviors they believe will result in valued outcomes than those they do not see as having favorable consequences. Davis (1989) stated that the outcome judgment is "concerned with the extent to which a behavior, once successfully executed, is believed to be linked to valued outcomes. Bandura's 'outcome judgment' variable is similar to perceived usefulness" (p. 321). According to Beaudry and Pinsonneault (2005), individuals' acceptance of IT depends on

the perceived consequences of use of IT. Assuming perceived value as an indicator of intention to use IT, H. Kim, Chan, and Gupta (2006) stated that the perceived value can be seen as a comparison between benefits and sacrifices individuals made when using IT. The perceived value of e-learning systems was defined by Levy (2006) as "an enduring core belief about the level of importance individuals attribute to an e-learning system as a whole" (p. 22). According to Allen and Seaman (2006), one of the critical barriers to widespread use of e-learning systems is instructors' limited perceived value of e-learning systems. Mahdizadeh, Biemans, and Mulder (2007) in their study on university instructors found that instructors' use of e-learning systems can be explained to a large extent by their perceptions of added value of e-learning systems. As a result, we have included the construct of instructors' perceived value of e-learning systems in our investigation to find its contribution to their intentions to use such systems.

Computer Self-Efficacy (CSE)

Derived from the self-efficacy construct of Bandura's (1986) SCT, computer self-efficacy (CSE) refers to the judgment of the individual's capability to use computers. Marakas, Johnson, and Clay (2007) noted that CSE has been shown to be an effective predictor of individuals' intention to use and actual use of IT. According to Igbaria and Ivari (1995), CSE implies that "individuals who consider computers too complex and believe that they will never be able to control these computers will prefer to avoid them and are less likely to use them" (p. 590).

CSE has become an important variable in IS research. Research studies indicated that individuals who possess high CSE are more likely to use IT frequently (Thatcher & Perrewe, 2002). In their seminal research study, Compeau and Higgins (1995) found that CSE has a significant effect on learning of application software. They found that individuals who demonstrated high CSE attained higher learning performance and eventual higher intention to use than those who had low CSE. Thus, CSE represents an important individual trait that appears to have effect on individuals' intention to use IT that, in turn, helps to understand individuals' actual use of IT. Therefore, such research emphasized, understanding CSE is important to the successful implementation of IT in organizations. Additionally, Hasan (2003) argued that CSE has been identified as a key determinant of IT-related ability and use of IT. Moreover, according to Shih (2008), Bandura's definition of self-efficacy suggests that the self-efficacy judgment of accepting e-learning systems is rooted in instructors' cognitive process. Therefore, following Bandura's SCT, Shih hypothesized that CSE is a cognitive factor referring to individuals' self-assessments regarding their confidence or ability to use e-learning systems. Thus, we anticipated that instructors with higher CSE are more likely to use IT in their instruction than those with lower CSE, and therefore we included CSE in our investigation.

Attitude toward E-Learning Systems

Attitude is a key construct that appears to influence individuals' intention to use IT in organizations (Bhattacherjee & Premkumar, 2004). In SCT, attitude predicts intentions that, in turn, predict individuals' behavior. Although some research has demonstrated that the formation of individuals' attitude is sufficient to affect their use of IT, other scholars argue that attitude must be transformed into intention to influence actual use (Blignaut, Burger, McDonald, & Tolmie, 2005). In TPB and TAM, intention is the pivotal concept in the attitude-behavior relationship because the immediate determinant of behavior, intention, is mediating the attitude on behavior (Bagozzi & Yi, 1989). That is, individuals' attitude is assumed to influence behavioral intention to use IT, which in turn influences actual use of IT (Bhattacherjee & Premkumar, 2004).

According to Brown and Venkatesh (2005), attitude is formed from cognitive beliefs and refers to an "individual's positive and negative feeling (evaluative effect) about performing the target behavior" (p. 216). Davis et al. (1989) stated that attitude is the degree to which the individual is

interested in specific systems, which has a direct effect on the intention to use as well as actual use of those systems. Thus, the extent to which systems are actually used over a certain period of time is influenced by the intention to use. Liaw et al. (2007) stated that attitude appears to be a major factor affecting individuals' use of IT; therefore, understanding individuals' attitude toward e-learning systems is important.

According to Albirini (2006), sometimes changes in attitudes are more important than changes in skills for instructors' use of e-learning systems. That is, in using e-learning systems, instructors' attitude appears to play more vital role than their technology skill. Consequently, instructors' attitude should be considered as a major predictor of their use of e-learning systems (Mahdizadeh et al., 2007). Badu-Nyarko (2006) noted that, traditionally, instructors have held a less than positive attitude toward e-learning systems. Therefore, future research on the use of e-learning systems should also include the construct of instructors' attitude toward e-learning systems (Johnson & Howell, 2005). Consequently, we have included the construct of instructors' attitude toward e-learning systems in our investigation in an attempt to learn about its potential implication on their intentions to use such systems.

Proposed Research Model

The research problem that this study addressed was the low level of instructors' use of e-learning systems compared to traditional learning methods in community colleges in the United States. Literature on e-learning systems in HEIs has identified a number of factors that contribute to instructors' use of such systems. These factors include instructors' resistance to change (Badu-Nyarko, 2006; Lammers & Murphy, 2003), perceived value of e-learning systems (Allen & Seaman, 2006; Levy, 2006), Computer Self-Efficacy (Hasan, 2003; Sam, Othman, & Nordin, 2005), and attitude toward e-learning systems (Badu-Nyarko, 2006; Naidu, 2004). In Figure 1, we provide the model for this research that was developed based on literature about resistance to change, perceived value, Computer Self-Efficacy, attitude, and IS use.

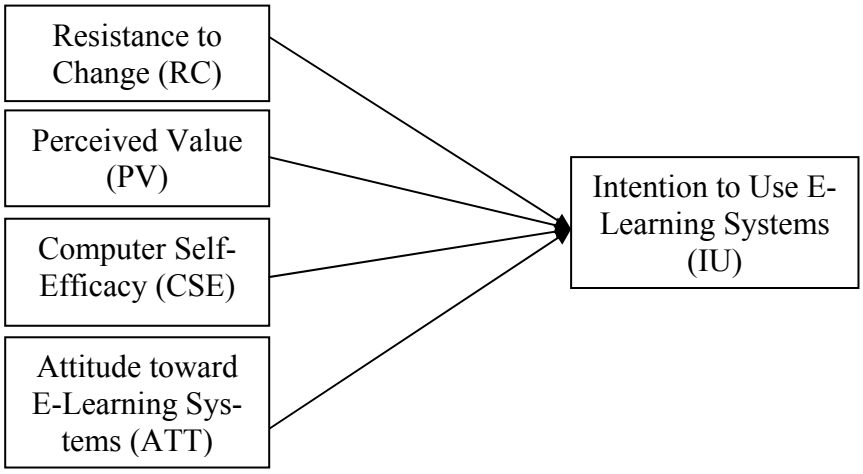

Figure 1: The conceptual model of key factors and their contribution to intention to use e-learning systems in community colleges.

The main goal of this study was to assess and empirically validate the predictive model above using the aforementioned factors that affect instructors' intention to use e-learning systems in community colleges. The main research question that this study attempted to address was: What

is the contribution of resistance to change, perceived value, CSE, and attitude toward e-learning systems on instructors' intention to use such systems in community colleges?

Significance of the Study

This study was directed at a special population group: community college instructors. Like instructors in any HEI, instructors in community colleges play a vital role in ensuring optimal use of available e-learning systems for instruction in their institution (Cohen, 2005). Therefore, it is important for community colleges to understand the factors that contribute to their instructors' use of e-learning systems (Cohen, 2005; Kisker & Outcalt, 2005). Community colleges provide education to millions of students and offer the highest percentage of e-learning courses (Nevill & Zimbler, 2006), but very little attention has been given in literature to the factors that affect instructors' acceptance of e-learning systems in community colleges (Cohen, 2005; Kisker & Outcalt, 2005). Although research on community colleges has been conducted for many decades, instructors have rarely been considered in that research (Cohen, 2005). Therefore, this study examined instructors' resistance to change, perceived value of e-learning systems, CSE, and attitude toward e-learning systems on their intention to use such systems in community colleges.

Methodology

Survey Instrument

A 51-item Web-based survey (a copy of which appears in the Appendix) was developed from existing validated instruments, using a Likert-type scale. Minor revisions were made to items' text to fit the focus of this study. The draft instrument was reviewed by an expert panel. Six items for RC were adapted from survey items developed and validated by Giangreco (2002). A set of 17 items for PV was developed by consolidating survey items developed and validated by Chiu, Hsu, Sun, Lin, and Sun (2005), Davis (1989), Greer and Murtaza (2003), Levy (2006), and Selim (2003). A set of 13 items for CSE was developed based on Brown and Venkatesh (2005) and Campeau and Higgins (1995). A set of 10 items for ATT was developed based on Chen, Gillenson, and Sherrell (2004), Karahanna, Straub, and Chervany (1999), Ngai et al. (2007), and Shih (2008). Four items for IU were adapted from survey instruments developed and validated by Brown and Venkatesh (2005) and Selim (2003).

Data Collection

After receiving permission from the Institutional Review Board, an invitation to participate in the research was sent via e-mail to all 300 full-time, part-time, and adjunct instructors in different academic departments at a mid-size community college in South Carolina. Participants were provided a link to the Web-based survey including instructions and study information. Instructors were requested to read the study information before participating in the Web-based survey. The study information informed instructors of their rights as research participant and stated that their participation in the survey was completely voluntary and anonymous. The completion of the Web-based survey was considered as evidence of their willingness to participate in the study. Instructors who decided to participate in the Web survey clicked on the link sent within the e-mail message. Once they clicked on the link, they were directed to the survey Web page

Upon completion of the one-month survey period, the Web-based survey was closed. To increase the response rate further, two weeks after the initial e-mail, a follow-up e-mail was sent to all instructors as a reminder to participate in the Web-based survey. A reminder notification has exhibited a positive effect on response rate for Web-based surveys in past research (Kaplowitz, Had-

lock, & Levine, 2004). A total of 124 instructors completed the survey, yielding a response rate of over 41%.

Pre-analysis Data Screening

To ensure the validity of the data and analyses, pre-analysis data screening procedures were conducted before further analyses. This was done to check response-set and outliers, following the recommendations made by Levy (2006). The response-set issue was addressed by eliminating cases in which 100% of responses to survey items were submitted with the same score. After visual inspection of all responses, two cases were identified as a full response-set at 100%, where the same answer score was selected for all 51 items of the survey. Outliers were identified by performing Mahalanobis distance analysis on survey items. After removal of two response-sets and three outliers, 119 usable cases were available for the analyses.

Reliability

To determine internal consistency across items for each construct, Cronbach's Alpha reliability tests were conducted for RC, PV, CSE, ATT, and IU. The result demonstrated very high reliability for each construct. IU has the highest estimate at .98 and CSE has the lowest at .95. Table 1 shows each construct's individual reliability estimate.

Table 1: Reliability Analysis

Variable	Cronbach's Alpha
RC	.961
PV	.978
CSE	.947
ATT	.964
IU	.979

Procedure for Data Analysis

Multiple Linear Regression (MLR) Analysis and Ordinal Logistic Regression (OLR) Analysis were used to study the effect of independent variables RC, PV, CSE, and ATT on dependent variable IU. MLR model was used to test linear relationship between independent variables and dependent variable. MLR analysis assumes the relationship between independent variables and dependent variable to be linear. MLR also assumes that data are normally distributed. Although it is relatively easy to meet the assumptions of MLR, there remained a concern over those assumptions not being met. Therefore, this study employed the OLR technique as well. OLR doesn't require the assumption of linearity in the relationship between independent variables and dependent variable. Also, OLR does not require normal distribution of data. Moreover, OLR should be used when developing models to predict ordinal variables (Hoffmann, 2004). In addition, by using both MLR and OLR, this study added robustness for the results by comparing the accuracy of the results generated by the two regression analyses.

Results and Discussion

Results of Multiple Linear Regression (MLR) Analysis

In order to perform MLR, each construct's items were aggregated. For each construct's item aggregation, the average of items was measured in five response levels. Using those aggregated

measures created for RC, PV, CSE, ATT, and IU, the MLR model was per-formed. Tables 2 and 3 show the results of MLR analysis.

Table 2: Overall MLR Model Summary (N = 119)

R	R^2	Adjusted R^2	Std. Error of The Estimate	Sig. F Change
.902	.813	.806	.62942	.000***

***p < .001

Table 3: MLR Coefficients (N = 119)

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	β	T	Sig.
1	(Constant)	-1.628	.247		-6.584	.000
	RC	.406	.113	.290	3.599	***.000******
	PV	.390	.093	.271	4.201	***.000******
	CSE	.318	.107	.181	2.974	***.004****
	ATT	.390	.126	.265	3.086	***.003****

***p < .001
**p < .01

MLR results, as shown in Tables 2 and 3, for predicting IU from four predictors RC, PV, CSE, and ATT, indicate that all four predictors are strongly significant with an overall prediction model: R2 = .813, Adjusted R2 = .806, F(df = 4, n = 119) = 123.757, p < .001. The finding value of adjusted R2 in this study indicated that the independent variables account for 80% of the accumulated variance. That is, the aforementioned predictive constructs RC, PV, CSE, and ATT in combination have significant effects on dependent variable IU. In particular, as shown in Table 3, weight-wise the impact of RC on dependent variable IU was greatest (β = .290, p < .001), followed by PV (β = .271, p < .001), ATT (β = .265, p < .01), and CSE (β = .181, p < .01). These weights represent the strength of independent variables in their effect on dependent variable. The β = .290 for RC represents that for one unit increase in RC, IU would decrease by .290 units. The β = .271 for PV represents that for one unit increase in PV, IU would increase by .271 units. The β = .181 for CSE represents that for one unit increase in CSE, IU would increase by .181 units. The β = .265 for ATT represents that for one unit increase in ATT, IU would increase by .265 units. It is important to note that the relationship between a particular independent variable and dependent variable is valid only when holding the other three independent variables constant.

Results of Ordinal Logistic Regression (OLR) Analysis

In order to perform the OLR, an aggregated integer measure for each of the variables was computed. Results of the OLR analysis, including coefficients (estimates) and significance levels, are presented in Tables 4 and 5.

Table 4: Overall OLR Model Fitting Information

Model	-2 Log Likelihood	χ^2	Df	Sig.
Intercept Only	300.951			
Final	112.385	188.566	4	.000***

***p < .001

Table 5: OLR Parameter Estimates

		Estimate	Std. Error	Wald	Df	Sig.
Threshold	[IU =1.00]	12.045	1.589	57.492	1	.000
	[IU =2.00]	15.583	1.949	63.946	1	.000
	[IU =3.00]	18.303	2.260	65.581	1	.000
	[IU =4.00]	21.168	2.512	71.021	1	.000
Location	RC	1.461	.402	13.198	1	***.000******
	PV	1.376	.360	14.592	1	***.000******
	CSE	1.247	.403	9.572	1	***.002****
	ATT	1.395	.459	9.228	1	***.002****

***p < .001
**p < .01

OLR analysis results, as presented in Tables 4 and 5, show that all four predictors were significant ($p < .001$) with an overall reliable model: -2 Log Likelihood = 112.385, $\chi 2$ (df = 4) = 188.566, $p < .001$. Parameter estimates show four good cut-off points, which represent the cut-off between 1-2, 2-3, 3-4, and 4-5 scale options in IU (see Table 5). The likelihood ratio test showed that all four independent variables combined significantly contribute to the probability of instructors' intention to use e-learning systems being classified above or below the four cut-off points (1-2, 2-3, 3-4, and 4-5). The likelihood ratio test is a test of the significance of the difference between the likelihood ratio (-2LL) for the theoretical model minus the likelihood ratio for a reduced model, that is 300.951-112.385. This difference value, called model chi-square = 188.566, was strongly significant (given the df = 4). In addition, the finding of significance, $p < .001$ (whereas, $p < .05$ is the cut-off for a good model), demonstrates that all four independent variables combined have a significant effect on predicting the probability of the dependent variable to be classified above or below the four cut-off points. Consequently, OLR results indicated that the four independent variables RC, PV, CSE, and ATT jointly have significant effect on the dependent variable IU.

OLR analysis, as shown in Table 5, also demonstrates that RC has the strongest effect (Estimate = 1.461, $p < .001$) on IU, followed by ATT (Estimate = 1.395, $p < .001$), PV (Estimate = 1.376, $p < .01$), and CSE (Estimate = 1.247, $p < .01$). That is, for one unit increase in RC (i.e., going from 1 to 2), participants are 1.461 times more likely to be classified in one cut-off point lower on IU, given that all of the other independent variables in the model are held constant. For one unit increase in PV (i.e., going from 1 to 2), participants are 1.376 times more likely to be classified in one cut-off point higher on IU, given that all of the other independent variables in the model are held constant. For one unit increase in CSE (i.e., going from 1 to 2), participants are 1.247 times more likely to be classified in one cut-off point higher on IU, given that all of the other independent variables in the model are held constant. For one unit increase in ATT (i.e., going from 1 to

2), participants are 1.395 times more likely to be classified in one cut-off point higher on IU, given that all of the other independent variables in the model are held constant.

The OLR model analysis results are close to being consistent with the results of the MLR model analysis. Both model analyses showed that all four predictive variables RC, PV, CSE, and ATT in combination have significant effect on dependent variable IU. This addressed the main research question. Additionally, results in both models indicated that weight-wise the order of impact of predictive variables on dependent variable IU was RC greatest and CSE lowest. However, PV was second and ATT was third in order in MLR analysis, while ATT was second and PV was third in order in OLR analysis. These results addressed the four specific research questions.

Items for RC adapted from Giangreco (2002) were developed and validated in pro-change behavior terms. For higher internal reliability and to avoid negative items, pro-change behavior items were adapted in the survey. As a result, although in MLR analysis and OLR analysis the parameter of RC was found positive like the parameters of other constructs, actually the relationship of RC with other constructs was negative.

Conclusion

The main goal of this study was to assess and empirically validate a theoretical model, as shown in Figure 1, to predict community college instructors' intention to use e-learning systems based on their resistance to change, perceived value, computer self-efficacy, and attitude toward those systems. The main research question that this study addressed was: What is the effect of resistance to change, perceived value, CSE, and attitude toward e-learning systems on instructors' intention to use such systems in community colleges**?**

The results of this study showed that the theoretical model proposed in this study was able to significantly predict instructors' intention to use e-learning systems. That is, community college instructors' resistance to change, perceived value, computer self-efficacy, and attitude has significant effects on their intention to use e-learning systems. MLR analysis indicated that the theoretical model of this study predicted instructors' intention to use 81% of the time. OLR analysis results demonstrated that all four independent variables were significant ($p < .001$) with an overall reliable model.

In addition, results indicated that although all four aforementioned predictive constructs have significant effect on intention to use, weight-wise resistance to change has greatest impact on intention to use. Results of both MLR and OLR analyses were consistent on resistance to change as having the greatest weight on predicting instructors' intention to use e-learning systems, while CSE in both analyses was found to have the least weight. Thus, this research finding demonstrated an inverse relationship between instructors' resistance to change and their intention to use e-learning systems. In simpler terms, the more an instructor is resistant to change, the less he/she is willing to use e-learning systems. As a result, it is highly recommended that prior to rolling out and promoting the use of e-learning systems among instructors, college administrators must first investigate the resistance level of their instructors towards such systems. Additionally, such administrators will be successful in increasing the use of e-learning systems by instructors, by providing training and proper awareness sessions to instructors in order to reduce their resistance to such technology.

Implications for Research and Practice

The implications of this study for the research are significant. This study contributes to the body of knowledge of e-learning acceptance in community colleges by constructing a theoretical model introducing the new constructs resistance to change and perceived value along with attitude and computer self-efficacy. The reason for introduction of different constructs in this theoretical mod-

el was the complexities of the organizational and social context within which instructors with varying individual characteristics make their decision about using e-learning systems.

The implications of this study for practice are twofold. The first implication of this study is to understand the key factors that affect community college instructors' intention to use e-learning systems. Understanding individual factors is expected to lead community college administrators to consider incentives for instructors' using e-learning systems. Second, the findings of this study will help IT practitioners, especially e-learning systems developers, to design and develop systems that are more likely to be accepted by instructors. The findings imply that IT practitioners in education should not only concern themselves with basic e-learning systems or software design but also address individual differences among the systems' users. Specifically, college administrators should spend more time reducing their instructors' resistance to e-learning systems in order to achieve a higher success rate with the use of such technology by their instructors. As indicated previously, it is the reduction of resistance to change that has the greatest impact on increasing the intention to use such systems. Therefore, awareness programs and short-term training sessions for instructors who appear to demonstrate the highest resistance can make a big difference in the success of using e-learning systems at community colleges.

Study Limitations

There were a number of limitations associated with this study. First, the data collected was self-reported by instructors. Therefore, the reliability of the survey data is dependent on the instructors' honesty and completeness of their responses. Second, as the survey was distributed through e-mail, it was limited to the instructors' willingness to take the initiative to read the e-mail and to take the time to complete the survey. There was virtually no incentive for the instructors to participate in this survey unless they were highly interested in such a line of research. Third, due to time and accessibility all participants in this study were from one mid-size community college in the southeastern United States. Since the sizes of community colleges vary extensively, the results of this study may be more applicable to similar-sized community institutions. Therefore, the findings can be generalized only to mid-size community colleges in the United States. Additional studies need to be done at other different-size community colleges in order to generalize the findings of this study in a broader scope.

Recommendations for Future Research

This study investigated the independent variables of instructors' intention to use e-learning systems. However, instructors' actual use of e-learning systems was not part of this study. Future studies may wish to extend this investigation and also measure instructors' actual use of e-learning systems.

In addition, the results of this research indicated that, although all four of the predictive constructs have significant effect on intention to use, weight-wise resistance to change has the greatest impact on intention to use. Bovey and Hede (2001) noted that it is important to distinguish between the behaviors of resistance and the causes behind it. Understanding the causes behind individuals' resistance to change is essential to understanding IT acceptance. Therefore, future studies need to investigate predictors that cause individuals' resistance to change. Solutions to resistance to change can be found by addressing the areas of concern through continued systematic research. Further research can focus on the extent to which individuals' resistance to change is caused by individuals' characteristics, to what extent by organizational settings, and to what extent by system design.

Acknowledgments

The authors would like to thank all the anonymous instructors who participated in this study. Additionally, the authors would like to thank the IJELLO editor and the anonymous reviewers for their careful review and valuable suggestions.

References

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage*, MIS Quarterly, 24*(4), 665-694.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). New York: Springer.

Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology, 52*, 27-58.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* Englewood Cliffs, NJ: Prentice-Hall.

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education, 47*(4), 373-398.

Allen, E. I., & Seaman, J. (2006). *Making the grade – Online education in the United States, 2006.* BABSON Survey Research Group. Needham, MA: The Sloan Consortium.

Badu-Nyarko, K. S. (2006). Faculty attitude towards distance education: A review of the literature. *International Journal of Instructional Technology and Distance Learning, 3*(5), Article04. Retrieved November 12, 2007, from http://www.itdl.org/Journal/May_06/article04.htm

Bagozzi, P. R., & Yi, Y. (1989). The degree of intention formation as a moderator of the attitude-behavior relationship. *Social Psychology Quarterly, 52*(4), 266-279.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Beaudry, A., & Pinsonneault, A. (2005). Understanding user responses to information technology: A coping model of user adaptation. *MIS Quarterly, 29*(3), 493-524.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *MIS Quarterly, 28*(2), 229-254.

Blignaut, P., Burger, A., McDonald, T., & Tolmie, J. (2005). Computer attitude and anxiety. *Encyclopedia of Information Science and Technology*, 495-501.

Bovey, W. H., & Hede, A. (2001). Resistance to original change: The role of defense mechanisms. *Journal of Managerial Psychology, 16*(7/8), 534-548.

Brown, A. S., & Venkatesh, V. (2005). Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. *MIS Quarterly, 29*(3), 399-426.

Chen, L., Gillenson, L. M., & Sherrell, L. D. (2004). Consumer acceptance of virtual stores: A theoretical model and critical success factors for virtual stores. *ACM SIGMIS Database, 35*(2), 8-31.

Chiu, C-M., Hsu, M-H., Sun, S-Y, Lin, T-C., & Sun, P-C. (2005). Usability, quality, value, and e-learning continuance decisions. *Computers & Education*, *45,* 399-416.

Cohen, A. M. (2005). UCLA community college review: Why practitioners and researchers ignore each other (even when they are same person). *Community College Review, 33*(1), 51-62.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*, 189-211.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Fuller, R. M., Vician, C., & Brown, S. A. (2006). E-learning and individual characteristics: The role of computer anxiety and communication apprehension. *The Journal of Computer Information Systems, 46*(4), 103-115.

Giangreco, A. (2002). Conceptualization and operationalisation of resistance to change. *Liuc Papers n., 103,* 1-28.

Greer, H. T., & Murtaza, B. M. (2003). Web personalization: The impact of perceived innovation characteristics on the intention to use personalization. *The Journal of Computer Information Systems, 43*(3), 50-55.

Gwebu, K. L., & Wang, J. (2007). The role of organizational, environmental and human factors in e-learning diffusion. *International Journal of Web-based Learning and Teaching Technologies, 2*(2), 59-78.

Hasan, B. (2003). The influence of specific computer experiences on computer self efficacy beliefs. *Computers in Human Behavior, 19*, 443-450.

Hoffmann, J. P. (2004). *Generalized linear models: An applied approach.* Boston, MA: Pearson Education Inc.

Hultman, K. (2003). Resistance to change, managing. *Encyclopedia of Information Systems, 3,* 693-705.

Igbaria, M., & Ivari, J. (1995). The effects of self-efficacy on computer usage. *Omega - International Journal of Management Science, 23*(6), 587-605.

Johnson, G. M., & Howell, A. J. (2005). Attitude toward instructional technology following required versus optional WebCT usage. *Journal of Technology and Teacher Education, 13*(4), 643-654.

Kaplowitz, D. M., Hadlock, D. T., & Levine, R. (2004). A comparison of web and mail survey response rates. *Public Opinion Quarterly, 68,* 94-101.

Karahanna, E., Straub, W. D., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly 23*(2), 183-213.

Kim, J. K., & Bonk, J. C. (2006). The future of online teaching and learning in higher education: The survey says……A survey substantiates some ideas about online learning and refutes others. *EDUCAUSE Quarterly, 29*(4), 1-14.

Kim, H., Chan, H. C., & Gupta, S. (2007). Value-based adoption of mobile internet: An empirical investigation. *Decision Support Systems, 43*, 111–126.

Kisker, C. B., & Outcalt, C. L. (2005). Community college honors and developmental faculty: Characteristics, practices, and implications for access and educational equity. *Community College Review, 33*(2), 1-21.

Klaus, T., Wingreen, S., & Blanton, E., J. (2007). Examining user resistance and management strategies in enterprise system implementation. *Proceedings of the Special Interest Group of Management Information Systems-CPR'07,* St. Louis, MO, USA, 55-62.

Lammers, W. J., & Murphy, J. J. (2003). A profile of teaching techniques used in the university classroom. *Active Learning in Higher Education, 3*(1), 54-67.

Levy, Y. (2006). *Assessing the value of e-learning systems*. Hershey, PA: Information Science Publishing.

Levy, Y., & Murphy, E. K. (2002). Toward a value framework for online learning systems. *Proceedings of the 35th Annual Hawaii International Conference on Systems Science (HICSS'02), USA, 1,* 5.

Liaw, S., Huang, H., & Chen, G. (2007). Surveying instructor and learner attitudes toward e-learning. *Computer and Education, 49*, 1066-1080.

Limayem, M., & Hirt, G. S. (2003). Forces of habit and information systems usage: Theory and initial validation. *Journal of the Association for Information Systems, 4*, 65-97.

Mahdizadeh, H., Biemans, H., & Mulder, M. (2007). Determining factors of the use of e-learning environments by university teachers. *Computers & Education*. 1-13.

Marakas, M. G., Johnson, D. R., & Clay. P. F. (2007). The evolving nature of the computer self-efficacy construct: An empirical investigation of measurement construction, validity, reliability and stability over time. *Journal of Association for Information Systems, 8*(1), 16–46.

Markus, L. (1983). Power, politics, and MIS implementation. *Communications of the ACM, 26*(6), 430-444.

Naidu, S. (2004). Trends in faculty use and perceptions of e-learning. *Asian Journal of Distance Education, 2*(2), 1-8.

Nevill, C. S., & Zimbler, L. (2006). Institutional policies and practices regarding postsecondary faculty: Fall 2003. *National Center for Educational Statistics – Institute of Education Science. U.S. Department of Education, 157*, 1-36.

Ngai, E. W. T., Poon, L. K. J., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education, 48*, 250-267.

Premkumar, G., & Bhattacherjee, A. (2006). Explaining information technology usages: A test of competing models. *Omega – The International Journal of Management Science, 36,* 64-75.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Sam, K. H., Othman, A. E. A., & Nordin, S. Z. (2005). Computer self-efficacy, computer anxiety, and attitude toward the internet: A study among undergraduate in Unimas. *Educational Technology and Society, 8*(4), 205-219.

Selim, H. M. (2003). An empirical investigation of student acceptance of course websites. *Computers & Education, 40*, 343-360.

Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computer & Education, 49,* 396-413.

Shih, H. (2008). Using a cognitive-motivation-control view to assess the adoption intention for Web-based learning. *Computer & Education, 50,* 327-337.

Sun, H. (2003). An integrative analysis of TAM: Toward a deeper understanding of technology acceptance model. *Proceeding of the Americas Conference on Information Systems* (*AMCIS) '03*, Tampa, FL.

Thatcher, J. B, & Perrewe, P. L. (2002). An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy. *MIS Quarterly, 26*(4), 381-396.

Venkatesh, V., Morris, M. G., Davis, B. G., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425 - 454.

Yohon, T., Zimmerman, D., & Keeler, L. (2004). An exploratory study of adoption of course management software and accompanying instructional changes by faculty in the liberal arts and sciences. *Electronic Journal of E-Learning, 2*(2), 313-320.

Zywno, S. M. (2002). Attitude of engineering faculty towards technology-assisted instruction – a polemic. *World Transaction on Engineering and Technology Education, 1*(1), 47-50.

Appendix – The Survey Instrument

The following is a list of statements related to your intended use of e-learning systems in your college. Please read each item and rate the level of likelihood you attribute to each statement from: (1) 'Very Unlikely' to (5) 'Very Likely'.

	Items	Very Unlikely	Unlikely	Neither Unlikely Nor Likely	Likely	Very Likely
		1	2	3	4	5
RC1:	I would actively co-operate with college administration to offer e-learning course using e-learning systems	1 □	2 □	3 □	4 □	5 □
RC2:	I would encourage actions taken by college administration to deploy e-learning systems	1 □	2 □	3 □	4 □	5 □
RC3:	I would try to convince other instructors of the advantage of teaching course using e-learning systems	1 □	2 □	3 □	4 □	5 □
RC4:	I would be enthusiastic about offering course using e-learning systems	1 □	2 □	3 □	4 □	5 □
RC5:	I would do much more of what is required for me to help my college to offer course using e-learning systems	1 □	2 □	3 □	4 □	5 □
RC6:	I would encourage other instructors to use e-learning systems for instruction	1 □	2 □	3 □	4 □	5 □

The following is a list of statements related to your intended use of e-learning systems in your college. Please read each item and rate the level of importance you attribute to each statement from: (1) 'Not Important' to (5) 'Very Important'.

	Items	Not Important	Not So Important	Slightly Important	Important	Very Important
		1	2	3	4	5
PV1:	Using e-learning systems for course instruction to enable me to accomplish instructional task more quickly is …	1 □	2 □	3 □	4 □	5 □

PV2:	Using e-learning systems for course instruction to improve my instructional performance is …	1 □	2 □	3 □	4 □	5 □
PV3:	Using e-learning systems for course instruction to increase my instructional productivity is …	1 □	2 □	3 □	4 □	5 □
PV4:	Using e-learning systems for course instruction to enhance my effectiveness on instruction is …	1 □	2 □	3 □	4 □	5 □
PV5:	Using e-learning systems for course instruction to make my instruction easier is …	1 □	2 □	3 □	4 □	5 □
PV6:	Usefulness of e-learning systems in my course instruction is …	1 □	2 □	3 □	4 □	5 □
PV7:	Using e-learning systems in my course instruction to improve my instructional quality is …	1 □	2 □	3 □	4 □	5 □
PV8:	Using e-learning systems in my course instruction to perform my instruction efficiently is …	1 □	2 □	3 □	4 □	5 □
PV9:	Using e-learning systems in my course instruction to be advantageous to my instruction is …	1 □	2 □	3 □	4 □	5 □
PV10:	Using e-learning systems in my course instruction to meet instructional objective without difficulty is …	1 □	2 □	3 □	4 □	5 □

Items	Not Important 1	Not So Important 2	Slightly Important 3	Important 4	Very Important 5
PV11: Using e-learning systems in my course instruction to have greater control over my instruction is …	1 □	2 □	3 □	4 □	5 □
PV12: Using e-learning systems in my course instruction to have a sense of accomplishment is …	1 □	2 □	3 □	4 □	5 □
PV13: Using e-learning systems in my course instruction to have a sense of self-fulfillment is …	1 □	2 □	3 □	4 □	5 □
PV14: Using e-learning systems in my course instruction to have a sense of following the trend is …	1 □	2 □	3 □	4 □	5 □
PV15: Using e-learning systems in my course instruction to have a sense of fun and enjoyment is …	1 □	2 □	3 □	4 □	5 □
PV16: Using e-learning systems in my course instruction to have a sense of intelligence is …	1 □	2 □	3 □	4 □	5 □
PV17: Using e-learning systems in my course instruction to have a sense of independence is …	1 □	2 □	3 □	4 □	5 □
PV18: Overall, using e-learning systems in my course instruction is …	1 □	2 □	3 □	4 □	5 □

The following is a list of statements related to your intended use of e-learning systems in your college. Please read each item and rate the level of confidence you attribute to each statement from: (1) 'Not At All Confident' to (5) 'Totally Confident'.

Items	Not At All Confident 1	Less Confident 2	Moderately Confident 3	Confident 4	Totally Confident 5
CSE1: To use e-learning systems even if I had never use a system like it before, I would feel	1 □	2 □	3 □	4 □	5 □
CSE2: To use e-learning systems if someone else helps me get started, I would feel	1 □	2 □	3 □	4 □	5 □
CSE3: To use e-learning systems if I can call someone for help if I got stuck, I would feel	1 □	2 □	3 □	4 □	5 □
CSE4: To use e-learning systems if I have just the built-in help facility for assistance, I would feel	1 □	2 □	3 □	4 □	5 □
CSE5: To use e-learning systems if I have seen someone else using it before trying it myself, I would feel	1 □	2 □	3 □	4 □	5 □
CSE7: To use e-learning systems if I have only the software manuals for reference, I would feel	1 □	2 □	3 □	4 □	5 □
CSE8: To use e-learning systems if I have lot of time to complete my instructional job, I would feel	1 □	2 □	3 □	4 □	5 □
CSE9: To use e-learning systems if no one is around to tell me what to do as I go, I would feel	1 □	2 □	3 □	4 □	5 □

Items	Not At All Confident 1	Less Confident 2	Moderately Confident 3	Confident 4	Totally Confident 5
CSE10: To use e-learning systems if I had used similar systems before this one for instruction, I would feel	1 □	2 □	3 □	4 □	5 □
CSE11:To use e-learning systems on my own, I would feel	1 □	2 □	3 □	4 □	5 □
CSE12:To download or install e-learning software/materials on my own, I would feel	1 □	2 □	3 □	4 □	5 □
CSE13:To navigate or search for document in any e-learning website, I would feel	1 □	2 □	3 □	4 □	5 □

The following is a list of statements related to your intended use of e-learning systems in your college. Please read each item and rate the level of agreement you attribute to each statement from: (1) 'Strongly Disagree' to (5) 'Strongly Agree'.

Items	Strongly Disagree 1	Disagree 2	Neither Disagree Nor Agree 3	Agree 4	Strongly Agree 5
ATT1: Using e-learning systems for course instruction is a good idea	1 □	2 □	3 □	4 □	5 □
ATT2: Using e-learning systems for course instruction is beneficial	1 □	2 □	3 □	4 □	5 □
ATT3: Using e-learning systems for course instruction is advantageous	1 □	2 □	3 □	4 □	5 □
ATT4: Using e-learning systems for course instruction is a positive step toward instruction	1 □	2 □	3 □	4 □	5 □
ATT5: Using e-learning systems for instruction is convenient	1 □	2 □	3 □	4 □	5 □

Items	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
	1	2	3	4	5
ATT6: Using e-learning systems for instruction is pleasant	1 □	2 □	3 □	4 □	5 □
ATT7: I like to use e-learning systems for course instruction	1 □	2 □	3 □	4 □	5 □
ATT8: E-learning systems provides an attractive learning environment	1 □	2 □	3 □	4 □	5 □
ATT9: Using e-learning systems for instruction is enjoyable	1 □	2 □	3 □	4 □	5 □
ATT10: Using e-learning systems for instruction is exciting	1 □	2 □	3 □	4 □	5 □

The following is a list of statements related to your intended use of e-learning systems in your college. Please read each item and rate the level of likelihood you attribute to each statement from: (1) 'Very Unlikely' to (5) 'Very Likely'.

Items	Very Unlikely	Unlikely	Neither Unlikely Nor Likely	Likely	Very Likely
	1	2	3	4	5
IU1: I intend to use e-learning systems for course instruction in the next semester	1 □	2 □	3 □	4 □	5 □
IU2: I expect to use e-learning systems for instruction in near future	1 □	2 □	3 □	4 □	5 □
IU3: I intend to use e-learning systems frequently for course instruction	1 □	2 □	3 □	4 □	5 □
IU4: I intend to use e-learning systems whenever the systems available	1 □	2 □	3 □	4 □	5 □

Biographies

Dr. Bilquis Ferdousi is a faculty member in Computer and Business Technology department at Spartanburg Community College in South Carolina. She is working as full time faculty member at community colleges for more than 10 years. She has long experience of teaching and developing online courses as well as serving in online learning advisory committees at community colleges. She developed online courses in Microcomputer Operating Systems, Computer Applications, and E-commerce. At present she teaches in the areas of Computer Programming, Data Structure, Computer Application, and E-commerce in face-to-face, hybrid, and online methods. She received her Master of Science in Information Systems from the University of Texas at Arlington and earned her Ph. D. in Information Systems from Nova Southeastern University. Her current research interests include the effect of gender difference on instructors' acceptance of e-learning systems, assessment of online learning outcome, assurance of data security in online learning, and critical success factors of E-commerce. Her paper on Determinants of Information Technology Acceptance has presented in a recent research symposium.

Dr. Yair Levy is an associate professor at the Graduate School of Computer and Information Sciences at Nova Southeastern University. During the mid to late 1990s, he assisted NASA to develop e-learning systems. He earned his Bachelor's degree in Aerospace Engineering from the Technion (Israel Institute of Technology). He received his MBA with MIS concentration and Ph.D. in Management Information Systems from Florida International University. His current research interests include security issues with e-learning systems, cognitive value of information technology (IT) and e-learning systems, effectiveness of information and e-learning systems. Dr. Levy is the author of the book "Assessing the Value of e-Learning systems." His research publications appear in the IS journals, conference proceedings, invited book chapters, and encyclopedias. Additionally, he chaired and co-chaired multiple sessions/tracks in recognized conferences. Since 2005, Dr. Levy is serving as the Editor-in-Chief of the International Journal of Doctoral Studies (IJDS). Additionally, he is serving as an associate editor for the International Journal of Web-based Learning and Teaching Technologies (IJWLTT). Moreover, he is serving as a member of editorial review or advisory board of several refereed journals. Additionally, Dr. Levy has been serving as a referee research reviewer for numerous national and international scientific journals, conference proceedings, as well as MIS and Information Security textbooks. He is also a frequent speaker at national and international meetings on MIS and online learning topics. To find out more about Dr. Levy, please visit his site: http://scis.nova.edu/~levyy/