Factors Influencing Usage of E-learning Systems in Taiwan's Public Sector: Applying the UTAUT Model

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Abstract

Knowledge workers need to continuously enhance their knowledge and skills to advance their work performance. While e-learning is increasingly being adopted, the issue of e-learning usage has arisen both in practice and in academia. This study aims to understand what factors influence employees' behavioral intention of e-learning within a public sector context. A total of 247 employees participated in this study. The results indicate that while performance expectancy, effort expectancy, and social influence significantly influence the behavioral intention of e-learning, behavioral intention and facilitating conditions significantly influence use behavior for e-learning systems. For organizations, the results suggest that managers may need to build an e-learning community to provide relevant mechanisms for promoting the usage of e-learning systems.

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1 Introduction

The importance of workplace learning, as an effective way for employees to acquire knowledge and skills, has been widely recognized for the development of individual competence as well as organizational effectiveness [1]. E-learning is increasingly being used by organizations as an emergent approach for enhancing the skills of its knowledge workers. The development of e-learning systems provides numerous benefits to individuals and organizations. Certainly, e-learning is being increasingly recognized as an important supportive structure for both formal and informal learning at work. It could enable employees to access the training materials from anywhere and at any time, factors that help the employees to overcome many challenges that they face with traditional training methods. Also, as the material is presented in various forms (video, audio, animation etc.), such systems offer an interesting learning environment. Furthermore, with an increase in demand for improving employees' skills and knowledge, which reflects on their work performance and productivity, e-learning systems enable organizations to offer training to their employees without adversely affecting their work performance.

Workplace learning is an important means for employees' continuous learning and professional development. E-learning is being recognized as an important supportive practice for learning at work. Until now, not many studies have been conducted about the level of acceptance of such systems [2]. While e-learning is increasingly being adopted as a training approach, the issue of the level of usage of e-learning systems has arisen both in practice and in academia. Since the ultimate purpose of work-integrated learning is to drive business results and to bring about positive changes in workplace behavior and job performance, this study investigates the acceptance of e-learning systems within the context of employees from the public sector. The purpose of this study is to apply UTAUT to model the acceptance of technology among government employees. This study has the potential to contribute to technology acceptance research by empirically testing UTAUT within the public sector context.

2 Literature Review and Hypotheses

In the e-learning literature, UTAUT has been widely employed by researchers to investigate students' intention to use and their continued use of e-learning systems [3] [4] [5] [6] [7]. In contrast to the proliferation of research on the adoption of e-learning by employees in organizational contexts, theory-driven empirical studies on the adoption of e-learning in public sector settings are relatively rare. Given the explanatory power of UTAUT in explaining the behavioral intention to adopt new technologies in diverse situations, the model has been adopted as the main framework for this study.

(1) E-learning systems in work settings

E-learning is regarded as a training medium, an instructional strategy [8], or a learning environment to deliver training to employees by the use of computer and web-based technologies [9]. With the use of e-learning, organizations can reduce the cost of training, increase the availability of training, and offer new possibilities to integrate various types of learning contents [5] [10]. On the other hand, e-learning can be extremely beneficial to employees by providing materials to employees on demand, anytime and anywhere, and tailoring learning resources based on their needs [11] [12]. In other words, e-learning plays an important role in providing continued education for knowledge workers.

(2) Unified Theory of Acceptance and Use Technology (UTAUT)

In literature, several models have been proposed to understand e-learning acceptance. A number of models have been developed to examine individuals' acceptance and intention to adopt new technologies in the world of information systems. One of the popular models in information technology acceptance is the UTAUT model. This theory, proposed by Venkatesh et al. [13], attempts to integrate and empirically compare elements from different technology acceptance models. UTAUT states that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions). In addition, UTAUT includes four moderators (age, gender, experience, and voluntariness of use) that contribute to a better understanding of the complexity of technology acceptance by individuals. UTAUT theorizes that performance expectancy, effort

expectancy, social influence, and facilitating conditions are direct determinants of behavioral intention or user behavior. This theory appreciably improves the explanatory power of this model. Thus, the following hypotheses have been proposed for this study.

H1: Performance expectancy will have a direct effect on behavioral intention to use e-learning system for employees.

H2: Effort expectancy will have a direct effect on behavioral intention to use e-learning system for employees.

H3: Social influence will have a direct effect on behavioral intention to use e-learning system for employees.

H4: Facilitating conditions will have a direct effect on use behavior to use e-learning system for employees.

H5: Behavioral intention will have a direct effect on use behavior to use e-learning system for employees.

Empirical evidences from past literature confirmed that age and gender play a very important moderating effect on the influence of performance expectancy on behavioral intention. According to Venkatesh et al. [13], evidences from past literature indicate that the influence of effort expectancy on behavioral intention is stronger in older workers and in young women. Therefore, we hypothesized gender, age, and experience to moderate the relationship between the constructs. In addition, as the earlier literature has proven that the effect was stronger in women and those with experience in mandatory situations, age, gender, experience, and voluntariness of use were theorized to moderate the influence of social influence and behavioral intention.

Beyond the indirect influences mediated by behavioral intention, gender, age, experience, and voluntariness of use are alternatively hypothesized to moderate the relation between employees' perception of the system and their intention to use e-learning. This implies that the effects of users' perceptual beliefs about using e-learning systems on their intention to actually use it are dependent on individual conditions. Research on gender differences indicates that men tend to be more task-oriented than women. Performance expectancy, which focuses on

task accomplishment, is likely to be more significant to men, whereas effort expectancy is more significant to women. Venkatesh, Morris, and Ackerman [14] mentioned that women tend to be more sensitive to others' opinions and, therefore, found that peer influence was more significant to women in the intention to use technology. Experience, in Venkatesh et al.'s model, was changed to e-learning experience. Several studies have shown that computer experience influences perceived usefulness and perceived ease of use, which, in consequence, affects people's actual use or intention to use specific systems. E-learning for the public sector is therefore more likely to be used by experienced e-learning users. Thus, experience needed to be considered in order to explain users' effort and performance expectancy. Further, use of the systems could be expected to increase as users of technology find help and support in using the systems effectively. Based on these arguments, we hypothesize:

H6: Gender will have a moderating effect on the relationship between performance expectancy of e-learning system and employees' intention to use the system.

H7: Gender will have a moderating effect on the relationship between effort expectancy of e-learning system and employees' intention to use the system.

H8: Gender will have a moderating effect on the relationship between social influence of e-learning system and employees' intention to use the system.

H9: Age will have a moderating effect on the relationship between performance expectancy of e-learning system and employees' intention to use the system.

H10: Age will have a moderating effect on the relationship between effort expectancy of e-learning system and employees' intention to use the system.

H11: Age will have a moderating effect on the relationship between social influence of e-learning system and employees' intention to use the system.

H12: Age will have a moderating effect on the relationship between facilitating conditions of e-learning system and employees' behavior to use system.

H13: Experience will have a moderating effect on the relationship between effort expectancy of e-learning system and employees' intention to use the system.

H14: Experience will have a moderating effect on the relationship between social

influence of e-learning system and employees' intention to use the system.

H15: Experience will have a moderating effect on the relationship between facilitating conditions of e-learning system and employees' behavior to use system.

H16: Voluntariness will have a moderating effect on the relationship between social influence of e-learning system and employees' intention to use the system.

3 Research Methodology

3.1 Research Design

With the widespread use of computers and information technology, there has been extensive research on users' acceptance and use of IT, and several models have been developed to explain them. We consider the factors that might affect the usage of e-learning among an organization's employees, based on UTAUT. At the same time, we test if employees' characteristics and the experience for e-learning will moderate the influence of these factors on behavioral intention. The research model to be tested in this study is shown in Figure 1.
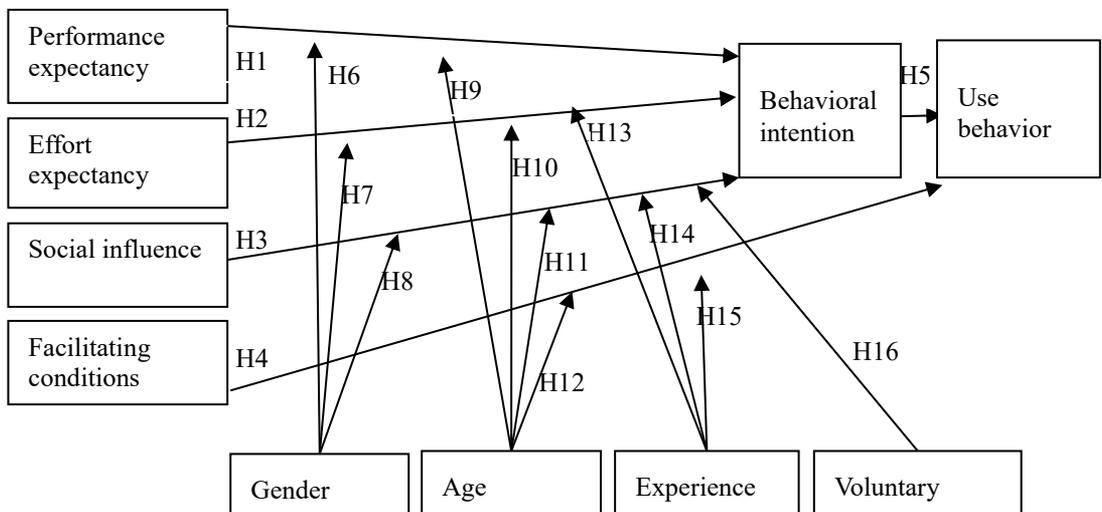

Figure 1: Research model for e-learning systems

3.2 Study context

As our goal is to test the theoretical model developed on the basis of insights, a survey-based approach is appropriate for this investigation. A questionnaire was designed that was placed as a web-based survey on the website My3Q. The link to the online survey was sent by e-mail to workers who used e-learning offered by the organization. For the purposes of this study and for further analysis, we collected the data of 247 public sector employees in Taiwan.

3.3 Measures

The measures used in this article were mainly adapted from relevant prior studies. For the questionnaires, multiple-item scales were adopted, and each item was measured using a 7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7). The items measuring four factors of UTAUT were adapted from Venkatesh et al. [13]. Items of performance expectancy reflect the improved work efficiency and convenience when using e-learning. Items of effort expectancy reflect the ease of learning to use or skillfully using e-learning. Items of social influence show the influence of people important to the user on the adoption behavior. Items of facilitating conditions reflect the resources and knowledge owned by the user. Behavioral intention, which is "the person's subjective probability that he or she will perform the behavior in question".

4 Data Analysis and Results

4.1 Data collection

The research methodology was based on empirical data collected through a questionnaire survey to test our research model. Through a hyperlink to My3Q.com survey website, the samples were collected from related information managers and employees who used e-learning system in the public sector of Taiwan. The first section includes information regarding the characteristics of respondents (e.g. age, gender, experience with e-learning system, voluntaries to use e-learning system), while each one of other sections includes questions that measure each of this research model constructs. The total number of

questionnaire's items is 23. Each item is measured using 7 Point-Likert scale. All such items have been adapted from the prior studies. A total of 247 usable data sets were used for further analysis. Table 1 summarizes the demographic features of the returned sample.

Table 1: Demographic characteristics of the sample

Variables	Categories	Frequency	Percent
Gender	Male	95	39%
	Female	152	61%
Age	<= 35	80	32%
	36-45	101	41%
	>=46	66	27%
Education	Junior College or below	74	30%
	University	126	51%
	Master and Ph. D.	47	19%
Work experience	<1 year	56	23%
	1-2 years	64	26%
	3-4 years	87	35%
	>5 years	40	16%
Positions	Management staff	30	12%
	Non-management staff	217	88%
Service years	<7 years	108	43%
	8-19 years	98	40%
	>20 years	41	17%

4.2 Analysis of the measurement model

In this study, a confirmatory factor analysis using Amos 17.0 was conducted to test the research model. In accordance with Anderson and Gerbing [15], the Structural Equation Modeling (SEM) analysis procedure was divided into two stages: the first stage involves performing the reliability analysis and confirmatory factor analysis specific to dimensions. The second stage entails verification of all assumptions of the study through SEM.

In order to assess survey logical consistency, ease of understanding, sequence of items, and contextual relevance, we adopted a pilot study; in this study, 37 participants, provided comments and suggestions on the item contents and instrument structure. The Cronbach's alpha scores, shown in Table 2, all of values ranged from 0.75 (for FC) to 0.93 (for PE and EE). According to Nunnally [16], the lowest limit for Cronbach's alpha should be above 0.70. The Cronbach's alpha

of each construct was also above 0.7, which indicated high internal reliability. In this study, we evaluated the measurement scales using the three criteria suggested by Fornell and Larcker [17]: (1) all factor loadings should be significant and greater than 0.5; (2) the composite reliability (CR) should be greater than 0.7; (3) the average variance extracted (AVE) should be greater than 0.5. As shown in Table 2, all the values of factor loading are greater than 0.5 and reach the significance level of $p = 0.001$. The CR values ranged from 0.77 to 0.94 are greater than 0.7. The AVE values within 0.54-0.80 are greater than 0.5. The three conditions of this study are coincident with good convergent validity. Then, as shown in Table 3, the square root of AVE between dimensions should be greater than correlation coefficient, satisfying Fornell and Larcker's criteria for discriminant validity. Thus, the results confirmed that this study conforms to the measurement of discriminate validity. In addition, our study was based on previous relevant research and literature [13], and reviewed the instrument for grammar, syntax, appropriateness, and confirmation that it appears to flow logically. Thus, all factors in this study had adequate face validity and content validity.

Table 2: Summary of reliability and validity for measures

Construct	Measure Item	Factor loading	CR	AVE	Cronbach's alpha
PE	PE1：I would find e-learning system useful in my job.	0.81	0.93	0.78	0.93
	PE2：Using e-learning system enable me to accomplish tasks more quickly.	0.91			
	PE3：Using e-learning system increase my productivity.	0.91			
	PE4：If I use e-learning system, I will increase my chances of getting a raise.	0.90			
EE	EE1：My interaction with e-learning system would be clear and understandable.	0.79	0.94	0.79	0.93
	EE2：It would be easy for me to become skillful at using e-learning system.	0.90			
	EE3：I would find e-learning system easy to use.	0.92			
	EE4：Learning to operate e-learning system is easy for me.	0.94			
SI	SI1：People who influence my behavior think that I should use e-learning system.	0.93	0.88	0.65	0.86
	SI2：People who are important to me think I should use e-learning system.	0.96			
	SI3：The senior management has been helpful in the use of e-learning system.	0.76			

	SI4：In general, the organization has supported the use of e-learning system.	0.50				
FC	FC1：I have the resource necessary to use e-learning system.	0.85	0.78	0.56	0.75
	FC2：I have the knowledge necessary to use e-learning system.	0.83			
	FC3：The system in compatible with other systems I use.	0.51			
BI	BI1：I intend to use e-learning system as often as needed.	0.86	0.93	0.80	0.92
	BI2：Whenever possible, I intend to use e-learning system.	0.91			
	BI3：To the extent possible, I would use e-learning system frequently.	0.92			
UB	UB1：How much times do you use e-learning system one week?	0.69	0.77	0.54	0.76
	UB2：How many hours do you spend on e-learning system?	0.54			
	UB3：How frequently do you use the e-learning system one week?	0.93			

Table 3: Correlation matrices and discriminant validity

Construct	Mean	SD	AVE	1	2	3	4	5	6
1. Performance expectancy	5.26	0.94	0.78	**0.88**					
2. Effort expectancy	5.41	0.82	0.79	0.47^{**}	**0.89**				
3. Social influence	5.02	0.89	0.65	0.59^{**}	0.45^{**}	**0.81**			
4. Facilitating conditions	5.39	0.88	0.56	0.37^{**}	0.54^{**}	0.40^{**}	**0.86**		
5. Behavioral intention	5.39	0.95	0.80	0.59^{**}	0.41^{**}	0.62^{**}	0.49^{**}	**0.89**	
6. Use behavior	2.25	0.63	0.54	0.20^{**}	0.30^{**}	0.29^{**}	0.30^{**}	0.45^{**}	**0.73**

Note. ** $p< .01$. Square root of AVE is on the diagonal.

4.3 Analysis of the structural model

In order to assess the model's overall goodness of fit, we followed recent recommendations on the convenience of using multiple adjustment indicators [18] [19]. The goodness fit indexes we used were: goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), goodness of fit index (AGFI), Tucker-Lewis index (TLI), chi-square divided by degrees of freedom (CMIN/DF), root mean square error of approximation (RMSEA), and the root mean squared residual (RMR). As Table 4 illustrates, we could then see that all the model-fit indices conformed their respective common acceptance levels suggested by previous research, thus this study has a fairly good fit with the data collected.

Table 4: The results of fit indices for measurement models

Goodness-of-fit measure	Recommended value	Results in this study	References		
GFI	>0.8	0.87	[20]		
CFI	>0.9	0.95	[21]		
NFI	>0.9	0.91	[21]		
AGFI	>0.8	0.83	[22]		
TLI	>0.9	0.97	[23][24]		
CMIN/DF	<=3	2.13	[21]		
RMSEA	<0.08	0.07	[25]		
RMR	<0.08	0.07	[25]		

4.4 Hypotheses testing

The eight common model-fit measures of the structural model were the same as those of the measurement model (see Table 4). This provided firm evidence of a good model data fit. Thus, we could proceed to investigate the differences of age, gender, experience, and voluntariness of use in the acceptance of e-learning system.

The sixteen hypotheses presented above were tested collectively using the SEM approach [26]. SEM is a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables [27]. The path significance of each hypothesized association in the research model and variance explained (R^2 value) by each path were examined. Standardized path coefficients in the research model are shown in Figure 1. As can be seen, H1, 2, 3, 4 and 5 were supported. The BI to use e-learning system in this study was predicted by PE ($\beta = .37$, $p < .001$), EE ($\beta = .12$, $p < .05$), and SI ($\beta = .30$, $p < .001$) and these variables together explained 45% of the variance in behavioral intention. Interestingly, the influence of performance expectancy and social influence on behavioral intention was stronger than effort expectancy. We confirmed that performance expectancy plays a critical role in predicting and determining users' intention. In addition, FC and BI also had significant positive effect on UB to use e-learning system ($\beta = .15$, $p < .05$; $\beta = .43$, $p < .001$), and these variables explained 26% of variance in use behavior. The results show that applying UTAUT to e-learning in a work setting can be useful for predicting user behavior.
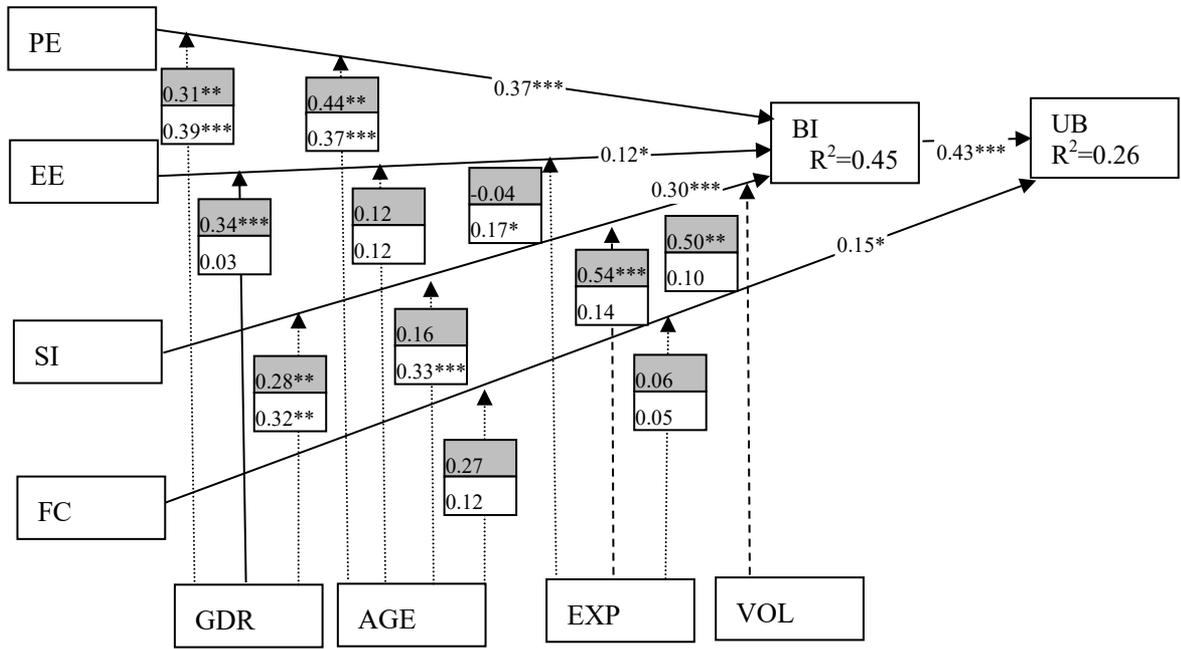
Note: 1. PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions;
         BI: behavioral intention; UB: use behavior
      2. Shaded boxes are coefficients for males, younger, less experience and involuntariness of use
      3. * $p< .05.$ ** $p< .01.$ *** $p< .001.$
      4. solid line: supported, broken line: partially supported, dotted line: not supported

Figure 2: Standardized path coefficients

Next, we proceeded to examine how gender, age, experience, and voluntary differences moderated the effects of PE, EE, SI and FC on BI and UB. The results of the analyses of gender, age, experience, and voluntaries differences are shown in Tables 5.

Table 5: The comparison of paths for moderating variables

Moderating variables		χ^2	df	$\Delta\chi^2$ from base model
	Unconstrained base model[a]	677.189	390	
	Constrained paths[b]			
Gender	PE-BI (H6)	679.297		$2.108^{n.s.}$
	EE-BI (H7)	682.898		**11.709^{***}**
	SI-BI (H8)	678.312		$1.123^{n.s.}$
	Unconstrained base model[a]	684.126	390	
	Constrained paths[b]			
Age	PE-BI (H9)	684.261		$0.135^{n.s.}$
	EE-BI (H10)	682.898		$0.028^{n.s.}$
	SI-BI (H11)	686.757		$2.631^{n.s.}$
	FC-UB (H12)	684.154		$0.028^{n.s.}$
	Unconstrained base model[a]	662.636	390	
	Constrained paths[b]			
Experience with e-learning system	PE-BI (H13)	665.781		$3.145^{n.s.}$
	SI-BI (H14)	667.688		**5.052^{*}**
	FC-UB (H15)	662.643		$0.007^{n.s.}$
	Unconstrained base model[a]	718.569	390	
Voluntaries to use e-learning system	Constrained paths[b]			
	SI-BI (H16)	724.258		**5.689^{*}**

Note: 1. PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; BI: behavioral intention; UB: use behavior
2. [a]Paths for the two groups were allowed to be freely estimated
3. [b]The path specified was constrained to be equal across the two groups
4. [n.s.]Not significant
5. [*] $p < .05$. [**] $p < .01$. [***] $p < .001$

On the other hand, to explore the moderating effects of age, gender, age, experience and voluntary, we divided the survey respondents into two groups based on the above variables, respectively. As Figure 2 illustrates, the path coefficients for the PE-BI, EE-BI, SI-BI links in the model were all significant for the male group, the path coefficients for the PE-BI and SI-BI links in the model were all significant, only EE-BI was not significant for the female group. For the older group, the path coefficients for the PE-BI and SI-BI links in the model were

all significant. However, the effect of EE and FC on BI and UB were not significant. Similarly, for the younger group, only the path coefficients for the PE-BI link in the model was significant and the path coefficients for the EE-BI, SI-BI, and FC-UB links were not significant. For the more experience group, the path coefficient for the EE-BI link in the model was significant. However, the effect of SI-BI and FC-UB were not significant. On the other hand, for the less experience group, the path coefficient for the SI-BI link in the model was significant, the effect of EE-BI and FC-UB were not significant. The path coefficient for the SI-BI link in the model was not significant for the voluntary group. For the involuntary group, the path coefficient for the SI-BI link in the model was significant. Finally, we summarize the overall hypotheses testing in the research model as Table 6.

Table 6: Results of hypotheses testing

Relationships		Results
H1	PE-BI	supported
H2	EE-BI	supported
H3	SI-BI	supported
H4	FC-UB	supported
H5	BI-UB	supported
Gender difference		
H6	PE-BI	not supported
H7	EE-BI	supported
H8	SI-BI	not supported
Age difference		
H9	PE-BI	not supported
H10	EE-BI	not supported
H11	SI-BI	not supported
H12	FC-UB	not supported
Experience with e-learning difference		
H13	EE-BI	not supported
H14	SI-BI	partially supported, less experience was significant and more experience was not significant

H15	FC-UB	not supported
Voluntary to use e-learning system difference		
H16	SI-BI	partially supported, involuntary was significant and voluntary was not significant

5 Conclusion

5.1 Discussion

E-learning, as an emergent approach, is being increasingly used by organizations for enhancing the skills of its knowledge workers. In the literature on training and human resource development, e-learning is regarded as a training mechanism for delivery of training to employees using computer technologies. This study sought to identify factors that could predict the surveyed public sector employees' intention to use and their actual use of the e-learning system by applying the UTAUT model. The results showed that the intention to use e-learning systems is a function of the perception that e-learning is useful (performance expectancy), that it exhibits ease of use (effort expectancy), and that important others believed that he/she should use e-learning (social influence). The predictive power of these three factors was substantial and accounted for nearly half of the variance in the intention to use e-learning. Among these three influencing factors, performance expectancy was by far the strongest predicting factor. Our results are consistent with a number of prior studies where performance expectancy has more of an influence than effort expectancy and social influence.

Model analysis also revealed that the use of e-learning systems was predicted by the intention to use e-learning, and the perception that organizational and technical support for the use of e-learning exists (facilitating conditions). Twenty-six percent of the variance in e-learning use was explained by these two factors. The positive effects of facilitating conditions and intention to use are similar to findings from previous IT adoption research. In this study, intention to use appeared to have a stronger effect on e-learning use than did facilitating conditions. The theory of planned behavior (TPB) suggests that intention to

perform behavior predicts future behavior. This study may be able to demonstrate the full effect of the intention to use on use behavior.

The study provides further evidence for the basic validity of the UTAUT model in that it confirmed the relationships among the variables in the model proposed by Venkatesh et al. [13]. The relationships between performance expectancy, effort expectancy, social influence, and intention to use e-learning were confirmed to exist and in the same direction as the UTAUT model proposes. All this provides evidence that the UTAUT model is applicable in public sector settings.

In addition, this study not only demonstrated the direct effects of effort expectancy, social influence, and facilitating conditions, which are the core constructs of the UTAUT model but also the effects of the three- or four-way interaction terms using age, gender, experience and voluntariness of use. Although the results indicate that the four moderating variables do not adjust the four main constructs effect, our UTAUT model provides a better understanding of technology adoption in e-learning systems in the public sector.

5.2 Discussions

E-learning, when inserted in the public sector, is a vehicle that meets organizational objectives, encourages the use of new technologies, and improves the service provided to citizens [28] . Thus, it is necessary to understand in detail the factors that help increase intention and behavior to use e-learning from not only theoretical perspectives but also managerial and empirical perspectives. The results of this research has indicted that three factors, namely performance expectancy, effort expectancy, and social influence, have a direct effect on employees' intention to use e-learning systems. Furthermore, facilitating conditions and behavioral intention have affected use behavior for e-learning systems. These results showed that as performance expectancy has a strong effect on employees' intention to use e-learning systems, employees intended to use these e-learning systems to improve their work performance and complete their work faster. Thus, we see that alignment of e-learning with job requirements is recognized as a critical factor in workplace e-learning usage. In accordance with the result that showed that social influence impacts behavioral intention, employees pay a great degree of attention to the opinions of people who are

important for them (e.g., their supervisors or their peers). Further, this study found that effort expectancy impacts the intentions of employees to use e-learning systems; thus, system designers should assure that e-learning systems are easy to use for employees. On the other hand, the result indicates that facilitating conditions have a strong effect on use behavior to use e-learning systems. Therefore, in order to motivate employees and increase their interest to use e-learning systems, managers should provide all relevant resources.

As hypothesized, PE, SI, and EE were significant predictors of usage intentions and together accounted for 45% of the variance in the intention to use e-learning systems. However, when we considered the moderating factors, we found that age, gender, experience and voluntariness of use are not significant moderators for performance expectancy, effort expectancy, social influence, and facilitating conditions. Consistent with prior research, performance expectancy had a stronger effect on behavioral intention than effort expectancy and social influence. In other words, it implies that employees tend to use these systems for the following reasons: first, because they can achieve some positive outcomes, second, because coworkers are using e-learning systems, and third, because they perceive that they are easy to use. In fact, e-learning systems are perceived as useful technology that provides many benefits to employees for performing their tasks. In general, employees use e-learning systems due to the relevant values of e-learning systems and because their coworkers recommend it. To increase the behavioral intention of e-learning systems, there is a need to develop systems that have a high level of usability. When the intention to use e-learning systems is higher, use behavior will accordingly increase.

5.3 Research Limitations and Future Research

While this study enhances our knowledge about the acceptance and use of the technology in the domain of e-learning, some improvements can be taken in the future. For example, further research may examine the effect of other moderators such education level, organizational compatibility. In addition, further studies are appealed to test the model used in other contexts (other countries and/or other technologies) to verify its robustness. Finally, future research can integrate other factors to UTAUT model (e.g., technological expectancy) or other model (e.g.,

service quality model) to enrich the conceptual framework used in this research.

References

[1] Doornbos, A. J., Simons, R. J. and Denessen, E., Relations between characteristics of workplace practices and types of informal work-related learning: a survey study among Dutch police, *Human Resource Development Quarterly*, **19**(2), (2008), 129-151.

[2] Scott, J. E. and Walczak, S., Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance, *Information & Management*, **46**(4), (2009), 221-232.

[3] Chiu, C. M., Sun, S. Y., Sun, P. C. and Ju, T. L., An empirical analysis of the antecedents of web-based learning continuance, *Computers & Education*, **49**(4), (2007), 1224-1245.

[4] Limayem, M. and Cheung, C. M., Understanding information systems continuance: The case of Internet-based learning technologies, *Information & management*, **45**(4), (2008), 227-232.

[5] Chiu, C. M. and Wang, E. T., Understanding web-based learning continuance intention: The role of subjective task value, *Information & Management*, **45**(3), (2008), 194-201.

[6] Hayashi, A., Chen, C., Ryan, T. and Wu, J., The role of social presence and moderating role of computer self-efficacy in predicting the continuance usage of e-learning systems, *Journal of Information Systems Education*, **15**(2), (2004), 139.

[7] Lau, S. H. and Woods, P. C., An investigation of user perceptions and attitudes towards learning objects, *British journal of educational technology*, **39**(4), (2008), 685-699.

[8] Burgess, J. R. and Russell, J. E., The effectiveness of distance learning initiatives in organizations, *Journal of Vocational Behavior*, **63**(2), (2003), 289-303.

[9] Derouin, R. E., Fritzsche, B. A. and Salas, E., E-learning in organizations, *Journal of Management*, **31**(6), (2005), 920-940.

[10] Rosenberg, M. J, *E-learning: Strategies for delivering knowledge in the digital age*, McGraw-Hill, New York, 2001.

[11] Ely, K., Sitzmann, T. and Falkiewicz, C., The influence of goal orientation dimensions on time to train in a self-paced training environment, *Learning and Individual Differences*, **19**(1), (2009), 146-150.

[12] Zhang, D., Zhao, J. L., Zhou, L. and Nunamaker Jr, J. F., Can e-learning

replace classroom learning?. *Communications of the ACM*, **47**(5), (2004), 75-79.

[13] Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D., User acceptance of information technology: toward a unified view. *MIS Quarterly*, **27**(3), (2003), 425-478.

[14] Venkatesh, V., Morris, M. G. and Ackerman, P. L., A longitudinal field investigation of gender differences in individual technology adoption decision-making processes, *Organizational behavior and human decision processes*, **83**(1), (2000), 33-60.

[15] Anderson, J. C. and Gerbing, D. W., Structural equation modeling in practice: A review and recommended two-step approach, *Psychological Bulletin*, **103**(3), (1988), 411.

[16] Nunnally, J. C., *Psychometric Theory*, McGraw-Hill, New York, 1978.

[17] Fornell, C. and Lacker, D. F., Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, **18**(1), (1981), 39-50.

[18] Hu, L. and Bentler, P., *Evaluating model fit*. In R. Hoyle (Ed.), Structural equation modeling: Concepts, issues and applications (pp. 76-99). Thousand Oaks, CA: Sage Publications, 1995.

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

[20] Seyal, A. H., Rahman, M. N. and Rahim, M. M., Determinants of academic use of the Internet: a structural equation model, *Behavior and Information Technology*, **21**(1), (2002), 71-86.

[21] Bentler, P. M. and Bonett, D. G., Significance tests and goodness of fit in the analysis of covariance structures, *Psychological Bulletin*, **88**(3), (1989), 588-606.

[22] Scott, J. E., The measurement of information systems effectiveness: Evaluating a measuring instrument, *Proceedings of the Fifteenth International Conference on Information System*, (1994), 111-128.

[23] Byrne, B. M., *Structural equation modeling with AMOS: Basic concepts, applications, and programming*, Hillsdale, NJ: Lawrence Erlbaum Associate, 2001.

[24] Hu, L. and Bentler, P. M., Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, *Structural equation modeling*, **6**(1), (1999), 1-55.

[25] Hair, J. T., Anderson, R. E., Tatham, R. L. and Black, W. C., *Multivariate data analysis with readings* (3rd Ed.), New York: Macmillan, 1992.

[26] Bagozzi, R. P., Yi, Y. and Phillips, L. W., Assessing construct validity in organizational research, *Administrative Science Quarterly*, **36**(3), (1991), 421-430.

[27] Hoyle, R. H., *The structural equation modeling approach: Basic concepts*

and fundamental issues. In R. H. Hoyle (Ed.), Structural equation modeling: Concepts, issues, and applications (pp. 1-14). Thousand Oaks, CA: Sage Publications, 1995.

[28] Langford, J. and Seaborne, K., To click or not to click: E-learning for the public sector. *Canadian Public Administration*, **46**(1), (2003), 50-75.