

CHRISTY M.K. CHEUNG AND MATTHEW K.O. LEE

10. EXPLORING THE GENDER DIFFERENCES IN STUDENT ACCEPTANCE OF AN INTERNET-BASED LEARNING MEDIUM

ABSTRACT

The specific features of the Internet have created an ideal place for teaching and learning. There has been a lot of attention on how and why students adopt and use an Internet-based learning medium. In recent years, we witnessed a significant amount of studies on the impact of contextual factors (such as gender difference) on technology usage. These studies have shown that male and female users seem to use technology in a very different way. In view of this, we attempt to explore the gender differences in student acceptance of an Internet-based learning medium (ILM). Specifically, we examine the gender differences in the relative impact of both extrinsic and intrinsic motivations, as well as the social influence on student acceptance of an ILM. A total of 504 students participated in this study. Attitude has the strongest direct effect on behavioral intention for both male and female students. Perceived usefulness influences attitude and behavioral intention to use an ILM more strongly for male students than it influences female students, whilst subjective norm is a more important factor determining female students' intention to use an ILM than it is for male students. We conclude the paper by discussing its theoretical and practical implications.

INTRODUCTION

“College students are heavy users of the Internet compared to the general population. Use of the Internet is a part of college students’ daily routine, in part because they have grown up with computers. It is integrated into their daily communication habits and has become a technology as ordinary as the telephone or television. (p. 2)” (Jones, 2002)

New generation has grown up with computers, and the use of the Internet has become a part of their daily routine. According to the Harris Interactive Survey (2009)¹, students are now spending twice as much time on their computers as compared to television. The Pew Internet and American Life Project (2009)² also found that young people are highly active Internet users. 93% of young people use the Internet. 68% go online for instant messaging, 54% read blogs and 14% regularly post blogs. 55% use Wikipedia and 73% use social network sites. Over 25% have downloaded podcasts, and over 75% view videos on video-sharing sites.

Men have long been the dominants of the Internet population. Recent studies³ however revealed that the Internet gender gap has been bridged. In the US, there are even more women getting online than men. Indeed, most studies have pointed out that the percentages of male and female Internet users are closest among the young people. However, a lot of these studies⁴ have indicated that teen's online activities are gender-specific. Doing homework and sending e-greetings are the top two online activities for girls, whilst downloading music and playing online games are the most frequently reported activities among teen boys. These variations yield some interesting gender-specific results that need further exploration.

The potential of the Internet as a learning medium has been widely appreciated, and the range of research related to learning and teaching using the Internet is unexpectedly broad (Wolfe, 2001). In the last decade, a lot of attention has been paid on student adoption and acceptance of the Internet as a learning medium (e.g., Lee, 2006; Lee et al., 2005; Ngai et al., 2007; Selim, 2007) and the Technology Acceptance Model (TAM) is the most widely used research framework to explain IT adoption and usage.

Basically, TAM scrutinizes technology acceptance from an extrinsic perspective. As addressed by Davis et al. (1992), perceived usefulness (PU) is an example of extrinsic motivation. In the context of using the Internet as a learning medium for the youth, however, we believe the impact of their emotional feeling, such as happiness and unhappiness, joy and frustration, pity and anger and the like, also play a crucial role in explaining IT acceptance. Often, no matter the behavior is extrinsically or intrinsically motivated, the behavior itself looks precisely the same. Extrinsic and intrinsic motivations, however, are two different drivers evoke behavior. Understanding students' underlying motivators for the acceptance of an Internet-based learning medium (ILM) can help course designers and academic institutions develop a better strategy for the system design and implementation. Moreover, TAM is a simple and precise model for understanding IT usage. The model does not account for social and personal control factors in the prediction of IT adoption. There is a need to extend the original TAM and examine the impact of subjective norm on student adoption of an ILM.

Gender is another research issue in this study. A growing number of studies investigating gender differences have demonstrated the importance of understanding the role of gender with respect to IT in a variety of contexts, including e-mail (Gefen and Straub, 1997), instant messaging (Debrand and Johnson, 2008), blogging (Zhang et al., 2009), Internet use (Teo, 2001), and social network sites (Shi et al., 2010). Interesting results have been found from these studies. For example, men are more likely to use Internet for entertainment and leisure, such as play online games, listening to music (Odell and Schumacher, 2000; Weiser, 2000). Women are more enthusiastic about using email and other computer technologies to keep in touch with others (Debrand and Johnson, 2008). Accordingly, it is likely that there exist gender differences in the student adoption of an Internet-based learning medium. In this study, we specifically explore the gender differences in the relative impact of both extrinsic and intrinsic motivations, as well as subjective norm on student acceptance of an ILM.

In the next section, we address the theoretical background and research hypotheses. We then describe our survey study to empirically test our research model. Next, we discuss the findings of our empirical study. Finally, we conclude the study by discussing the implications for both research and practice.

THEORETICAL BACKGROUND

In this study of student adoption of Internet-based learning medium, the research model is built on theoretical frameworks used or suggested in prior studies.

Technology Acceptance Model

Technology Acceptance Model (TAM) is the most well-known and robust model among a variety of behavioral models in explaining IT adoption and usage. Critical assessments of TAM and comparisons with other intention-based models, such as Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB), demonstrated that TAM is a theoretical construct customized for the study of computer-technology acceptance with higher research significance in the IS discipline (Davis, Bagozzi, & Warshaw, 1989; Taylor and Todd, 1995).

“The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. (p. 985)” (Davis, Bagozzi, & Warshaw, 1989)

In short, TAM is a simple and precise model for understanding IT usage with few but salient constructs. TAM proposed that the acceptance of a technological innovation is driven by one’s attitude toward the use of the innovation which, in turn, is determined by two beliefs, namely, perceived usefulness and perceived ease of use. Because of its strong predictive power in explaining IT adoption, TAM has been widely used in IS research (e.g., Chau, 1996; Straub, Keil, & Brenner, 1997; Venkatesh & Davis, 2000; Venkatesh & Morris, 2000).

Human Motivation Theory

Human motivation theory is widely adopted in behavioral studies. Prior studies have shown that motivation is responsible for why behavior is initiated, persists, and stops, as well as what choices are made. A number of theoretical perspectives (e.g., Atkinson’s theory of achievement motivation, Rotter’s social learning theory, student motivation theory) have been proposed to examine the motivations of students. One useful perspective posits that behavior can be extrinsically and intrinsically motivated, this theoretical approach appears rather pertinent for the study of motivation of students. (Deci & Ryan, 1985; Deci & Ryan, 1991)

Extrinsic motivation pertains to a wide variety of behaviors which are engaged in response to something apart from its own sake, such as reward or recognition or the dictates of other people. Contrary to extrinsic motivation, intrinsic motivation

refers to the fact of doing an activity for its own sake, and the activity itself is interesting, engaging, or in some way satisfying. Consistent with other research on motivation, Davis et al. (1992) found both extrinsic and intrinsic factors are significantly affecting people's behavioral intention to use a new innovation. Their study shows that if an individual finds its advantages to use a particular technology and the technology facilitates the individual's productivity, the individual perceives this technology as useful and he/she is likely to have an extrinsic motivation to use it. On the other hand, if an individual finds fun and enjoyment in using a particular technology, the individual tends to have an intrinsic motivation to use it. Igarria et al. (1994) and Venkatesh (1999) also obtained similar findings, where both perceived usefulness and perceived enjoyment are significant determinants of technology acceptance.

Social Influence

Social influence has been widely used to explain group and collective behavior (Bagozzi and Lee, 2002). The social influence underlying subjective norm reflects the influence of expectations from significant others and represents what Kelman (1958) terms "Compliance". In IS adoption research, the compliance process appeared to be paramount. Before users have any actual usage experience with a new system, second-hand information, particularly from the primary reference groups (family or friends), are important for their usage decisions (Cheung and Lee, 2010).

Gender Differences in IT Adoption

The questions of gender differences have been a consuming interest in psychology or social psychology for many years. For example, we witness gender difference studies in emotional study (Balswick, 1988), aggressive behavior (Lightdale & Prentice, 1994), criminal justice (Chong, 1998), voting (Studlar, McAllister, & Hayes, 1998), child psychology (Hussong, Curran, & Chassin, 1998), and self-esteem (Quatman & Watson, 2001). Research on gender differences with respect to information technology has attracted attention in recent years (Gefen and Straub, 1997; Wilson, 2004). Studies in IS research have also identified gender as an important moderating variable (Venkatesh et al., 2003; Ahuja and Thatcher, 2005; Shen et al., 2010).

In terms of technology acceptance studies, Venkatesh and Morris (2000) highlighted the gender differences in evaluating new technologies. For instance, technology usage decisions are more strongly influenced by perceptions of usefulness for men, while women are more strongly influenced by perceptions of ease of use and subjective norm. Some researchers explained the gender differences in terms of the way they communicate and interact (Debrand and Johnson, 2008; Teo, 2001).

RESEARCH MODEL AND HYPOTHESES

Figure 1 depicts the research model of student adoption of an Internet-based learning medium (ILM). This research model expands the Technology Acceptance

Model (TAM) by integrating human motivation theory, through the inclusion of the intrinsic motivator perceived enjoyment as a salient determinant of attitude toward the use of an ILM. In addition, the original TAM does not account for social factors in the prediction of IT adoption and usage. We extend the model by adding subjective norm as the determinant of behavioral intention. Since the focus of this study is to explore the gender differences in the adoption of an ILM, we will primarily examine how gender affects the effects of perceived usefulness, perceived ease of use, and perceived enjoyment on attitude toward the use of an ILM, as well as the effects of perceived usefulness, perceived enjoyment, and subjective norm on behavioral intention.

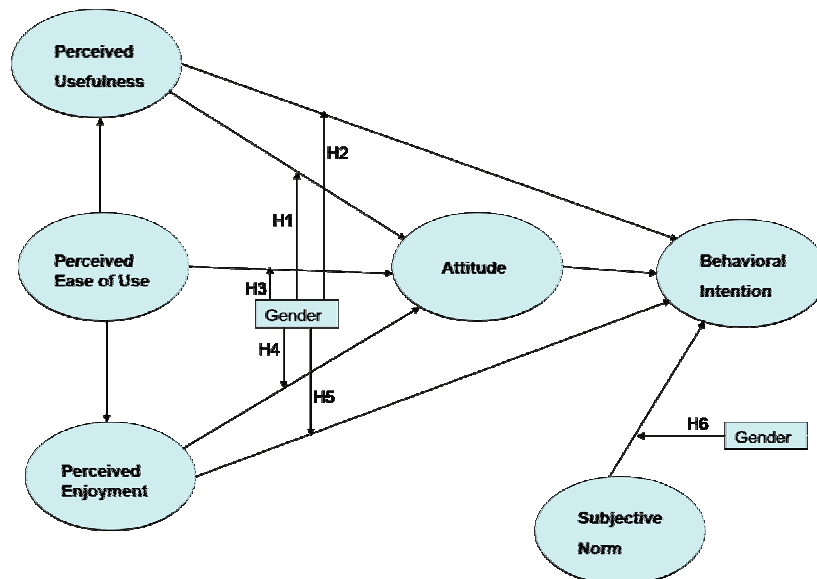


Figure 1. Research model.

Extrinsic Motivation

“Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions. (p. 1112)” (Davis et al., 1992) According to Davis et al. (1992), perceived usefulness in the technology acceptance model (TAM) is an example of extrinsic motivation.

In the current study of the student acceptance of an ILM, we expect that perceived usefulness will be a critical determinant of attitude as well as intention to use the learning innovative. Students can use an ILM to access and download teaching materials anytime and anywhere. They can also use online chat rooms or discussion boards to communicate and discuss with their instructors and fellow classmates. Moreover, male are stereotyped as “assertive” and “logical” (Venkatesh

and Morris, 2000). They tend to be more task oriented than female, as a result, we expect that perceived usefulness influences both attitude and behavioral intention more strongly for male than for female.

H1: Perceived usefulness will influence attitude toward the use of an ILM more strongly for male students than it will influence female students.

H2: Perceived usefulness will influence behavioral intention to use an ILM more strongly for male students than it will influence female students.

Consistent with prior studies using TAM, we believe the relationships among other constructs remain significant. For instance, we expect that the easier the student perceives the use of an ILM to be, the more useful it is perceived to be, and the better the feeling toward using it. We also expect that the better the student feels about the use of an ILM, the higher their intention of using it. Frankel (1990) found that female had a higher level of computer anxiety compared to male. As suggested by Venkatesh and Davis (2000), the inverse relationship between computer anxiety and computer self-efficacy is an important factor of perceived ease of use. Venkatesh and Morris (2000) further suggested that high computer anxiety lowered self-efficacy, and resulted in lower ease of use perception and their favorable feeling of using.

H3: Perceived ease of use will influence attitude toward the use of an ILM more strongly for female students than it will influence male students.

Intrinsic Motivation

“Intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se. (p. 1112)” (Davis et al., 1992) Much of the prior IT adoption and usage studies focused primarily on the impact of extrinsic motivator (i.e. perceived usefulness). Some IS researchers (i.e. Davis et al., 1992; Igbaria et al., 1994; Venkatesh et al., 1999), on the other hand, urged that intrinsic motivation also plays a significant role in stimulating the IT adoption and usage. In the current study, perceived enjoyment is postulated as an intrinsic motivator.

Similar to the utilitarian value, we expect that perceived enjoyment will have a significant impact on both attitude toward the use of an ILM, and intention to use an ILM. Since the Internet-based learning innovative provides students with a self-paced and interactive learning experience, students may feel more playful and challenging to use an ILM. In addition, they may feel more enjoyable through connecting with other classmates in this virtual learning environment. Meanwhile, prior studies have shown that men spend on time using the Internet for entertainment and leisure than women (Odell and Schumacher, 2000; Weiser, 2000). It is very likely that perceived enjoyment plays a more significant role for male than female to determine whether they want to adopt a particular technology.

H4: Perceived enjoyment will influence attitude toward the use of an ILM more strongly for male students than it will influence female students.

H5: Perceived enjoyment will influence behavioral intention to use an ILM more strongly for male students than it will influence female students.

Social Influence

In the current study, we believe that subjective norm which reflects social pressure from significant others to perform a behavior, will remain important in determining student intention to use an ILM. Prior studies suggested that female are stereotyped as “interdependent” and “nurturing”. They tend to have a greater concern on others’ feelings than male. As suggested by Venkatesh and Morris (2000), female tended to consider the opinions of the others more for the use of new technology than male. We expect that subjective norm will have a higher impact on female students’ decision to adopt the use of ILM.

H6: Subjective norm will influence behavioral intention to use an ILM more strongly for female students than it will influence male students.

METHOD

Setting and Procedures

This study aims at investigating student adoption of an Internet-based learning medium, in particular, gender differences in the IT adoption. The learning innovation in question was known as “FaBWeb”, which was created as an Internet learning portal containing lecture and tutorial notes, chat-room facilities, and streaming videos of lectures to provide out-of-classroom support to the regular campus-based students at a university in Hong Kong. The Internet-based learning medium was introduced to the first-year undergraduate students at the beginning of the semester. These students were requested to complete questionnaire that covered all the constructs in our research model. Of the 504 usable questionnaires collected, 325 respondents were female and 179 were male.

Measures

The measures of the TAM are well-researched and validated. Measures for perceived usefulness (PU), perceived ease of use (PEOU), perceived enjoyment, attitude (A), and behavioral intention (BI), were borrowed from Davis’ prior studies (Davis 1993; Davis et al., 1989). Measures of subjective norm were borrowed from Taylor and Todd (1995). Except the measures of attitude, the sample items of other constructs were modified to fit the specific context of Internet-based learning and the measures were phrased on a seven-point Likert scale, from 1=strongly disagree to 7=strongly agree. A series of statements for attitude toward an Internet-based learning medium were asked, from very bad to very good, very foolish to very wise, very unpleasant to very pleasant, and dislike very much to like very much. [Table 1](#) summarizes the sample items of this study.

RESULTS

Partial Least Squares (PLS) was used to analyze the research model. PLS has been widely used in IS research since it enables the researchers to analyze both the

measurement model and the structural model simultaneously. In addition, there is no normal distribution requirement for data when using PLS and it applies to small sample cases (Chin, 1998). Hence, we chose PLS to perform data analysis in this study. In this section, we first examined the measurement model and then the structural model.

Measurement Model

Convergent validity indicates the extent to which the items of a scale that are theoretically related should correlate highly. A composite reliability of 0.70 or above and an average variance extracted of more than 0.50 are deemed acceptable (Hair et al., 2006). Table 1 summarizes the item loading, composite reliability, and average variance extracted of the measures of the constructs of our research model. All measures fulfil the recommended levels, with the composite reliability ranging from 0.703 to 0.949 and the average variance extracted ranging from 0.531 to 0.870.

Table 1. Summary of the psychometric properties of the measures

Measurement instrument	All			Male			Female		
	IL	CR	AVE	IL	CR	AVE	IL	CR	AVE
<i>Perceived Usefulness (PU)</i>		0.723	0.568		0.864	0.761		0.658	0.534
Using ILM will improve my course grades	0.823			0.859			0.577		
The advantages of ILM will outweigh the disadvantages	0.677			0.885			0.963		
<i>Ease of Use (PEOU)</i>		0.703	0.543		0.884	0.792		0.683	0.519
Instructions for using ILM will be hard to follow.	0.680			0.873			0.705		
It will be difficult to learn how to use ILM.	0.790			0.906			0.735		
<i>Perceived Enjoyment (PENJ)</i>		0.769	0.531		0.787	0.558		0.733	0.487
I would find using ILM to be enjoyable	0.588			0.607			0.511		
The actual process of using ILM would be pleasant	0.846			0.887			0.822		
I would have fun using ILM	0.730			0.721			0.724		

STUDENT ACCEPTENCE OF AN INTERNET-BASED LEARNING MEDIUM

Table 1. (Continued)

<i>Attitude (ATT)</i>		0.906	0.707		0.870	0.656		0.942	0.803
The idea of using ILM is: (Very Bad – Very Good)	0.903			0.915			0.900		
The idea of using ILM is: (Very Foolish – Very Wise)	0.804			0.941			0.862		
Using ILM would be: (Very Unpleasant – Very Pleasant)	0.908			0.913			0.919		
Using ILM is an idea: (Dislike Very Much – Like Very Much)	0.737			0.262			0.907		
<i>Subjective Norm (SN)</i>		0.925	0.870		0.935	0.878		0.928	0.865
People who influence my behavior would think that I should use ILM.	0.925			0.918			0.927		
People who are important to me would think that I should use ILM.	0.940			0.956			0.933		
<i>Behavioral Intention (BI)</i>		0.949	0.861		0.949	0.861		0.949	0.860
I intend to use ILM regularly next semester	0.922			0.912			0.929		
I intend to use ILM next semester to assist me to prepare projects, papers, and assignments	0.930			0.942			0.920		
I intend to use ILM frequently next semester	0.931			0.929			0.934		

Note: *IL*- Item Loading, *CR* – Composite Reliability, *AVE* – Average Variance Extracted.

Discriminant validity is the extent to which the measure is not a reflection of some other variable. It is indicated by low correlations between the measure of interest and the measures of other constructs. Discriminant validity of the measures is demonstrated when the squared root of the average variance extracted for each construct is higher than its correlations with all other constructs (Fornell and Larcker, 1981). Table 2 shows that the square root of average variance extracted for each construct is greater than the correlations between the constructs and all other constructs. The results suggested an adequate discriminant validity of the measures used in the current study.

Table 2. Correlation matrix of the constructs

<i>Construct (Overall)</i>	<i>ATT</i>	<i>BI</i>	<i>PENJ</i>	<i>PEOU</i>	<i>PU</i>	<i>SN</i>
Attitude (ATT)	0.841					
Behavioral Intention (BI)	0.529	0.928				
Perceived Enjoyment (PENJ)	0.402	0.258	0.729			
Perceived Ease of Use (PEOU)	0.175	0.141	0.093	0.737		
Perceived Usefulness (PU)	0.162	0.155	0.122	0.019	0.754	
Subjective Norm (SN)	0.361	0.372	0.228	0.029	0.113	0.933
<i>Construct (Male)</i>	<i>ATT</i>	<i>BI</i>	<i>PENJ</i>	<i>PEOU</i>	<i>PU</i>	<i>SN</i>
Attitude (ATT)	0.810					
Behavioral Intention (BI)	0.536	0.928				
Perceived Enjoyment (PENJ)	0.472	0.161	0.747			
Perceived Ease of Use (PEOU)	0.375	0.166	0.242	0.890		
Perceived Usefulness (PU)	0.642	0.451	0.320	0.320	0.872	
Subjective Norm (SN)	0.368	0.303	0.253	0.130	0.237	0.937
<i>Construct (Female)</i>	<i>ATT</i>	<i>BI</i>	<i>PENJ</i>	<i>PEOU</i>	<i>PU</i>	<i>SN</i>
Attitude (ATT)	0.896					
Behavioral Intention (BI)	0.543	0.928				
Perceived Enjoyment (PENJ)	0.374	0.320	0.698			
Perceived Ease of Use (PEOU)	0.182	0.155	0.077	0.720		
Perceived Usefulness (PU)	0.415	0.349	0.241	0.056	0.444	
Subjective Norm (SN)	0.349	0.412	0.220	0.018	0.197	0.930

(Note: Diagonal Elements are square roots of Average Variance Extracted).

Structural Model – Overall Variance Explained

Test of the significance of all paths was performed using the bootstrap resampling procedure. Figure 2 depicts path coefficients and the overall explanatory power of the two research models (male student vs. female student) in this study.

The model for male student accounts for 51% of the variance in attitude and 33.4% of the variance in behavioral intention. All significant paths are indicated with an asterisk and all path coefficients are found statistically significant. Similarly, the model for female student accounts for 27.2% of the variance in attitude and 37.5% of the variance in behavioral intention. Except the paths between perceived ease of use and perceived usefulness, perceived ease of use and perceived enjoyment, as

STUDENT ACCEPTANCE OF AN INTERNET-BASED LEARNING MEDIUM

well as perceived enjoyment to behavioral intention, all other path coefficients are found statistically significant.

For male students, attitude exhibits the strongest direct effect on behavioral intention to use an ILM ($\beta=0.431$), followed by perceived usefulness ($\beta=0.186$), perceived enjoyment ($\beta=0.138$), and subjective norm ($\beta=0.135$). Perceived usefulness ($\beta=0.508$), perceived enjoyment ($\beta=0.247$), and perceived ease of use ($\beta=0.147$) all demonstrate a significant impact on attitude. Perceived ease of use also has a significant impact on perceived usefulness ($\beta=0.320$) and perceived enjoyment ($\beta=0.242$).

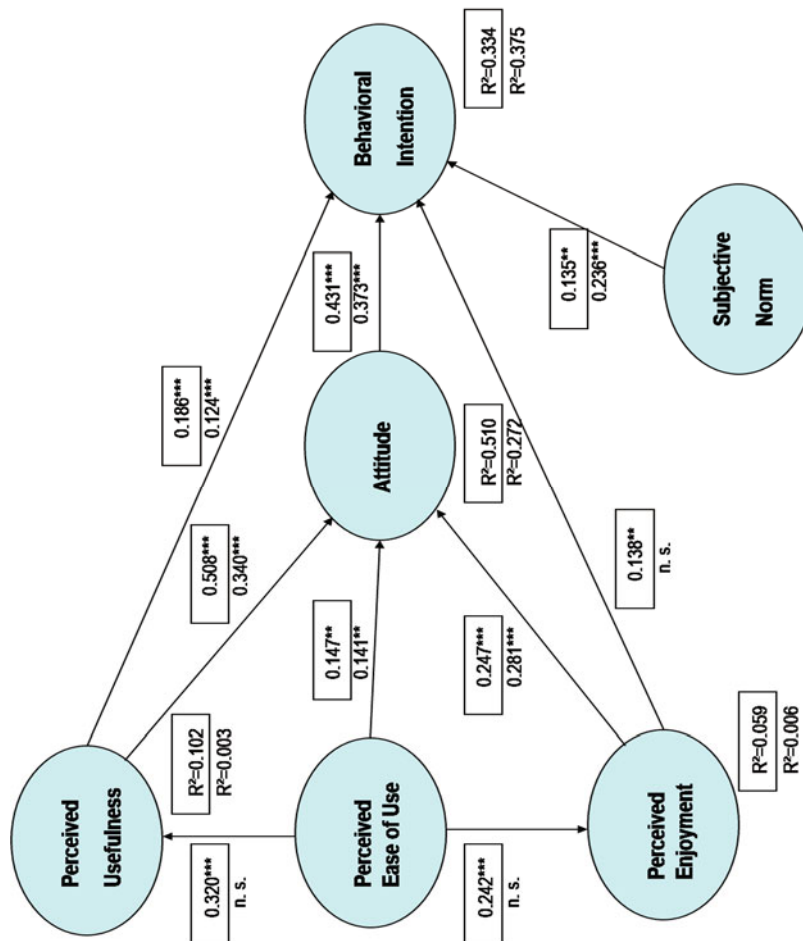


Figure 2. Results.

(Notes: The statistics for male students are in the boxes. $**p<0.05$ $***p<0.01$).

For female students, attitude also has the strongest direct effect on behavioral intention to use an ILM ($\beta=0.373$), followed by subjective norm ($\beta=0.236$) and perceived usefulness ($\beta=0.124$). Perceived enjoyment does not have any significant effect on their intention to use an ILM. Perceived usefulness ($\beta=0.340$), perceived enjoyment ($\beta=0.281$), and perceived ease of use ($\beta=0.141$) all demonstrate a significant impact on attitude. Perceived ease of use however does not have any impact on perceived usefulness and perceived enjoyment.

Structural Model – Hypotheses Testing

Hypotheses on the impact of gender can be tested by statistically comparing corresponding path coefficients between the two structural models (Male student vs. Female student). The statistical comparison was carried out using the procedure as stated in Appendix A. [Table 3](#) summarizes the comparisons.

Table 4. Path comparisons between male students and female students

<i>Hypothesis</i>	<i>Male Students</i>	<i>Female Students</i>	<i>t-statistics</i>	<i>Conclusion</i>
H1: PU->ATT	0.508	0.340	43.364	H1 is supported
H2: PU->BI	0.186	0.124	15.811	H2 is supported
H3: PEOU->ATT	0.147	0.141	1.198	H3 is not supported
H4: PENJ-> ATT	0.247	0.281	-8.488	H4 is not supported
H5: PENJ-> BI	0.138	n.s.	N.A.	H5 is supported
H6: SN-> BI	0.135	0.236	-24.842	H6 is supported

To examine the moderating effect of gender, we performed analysis in male student group and female student group separately. As show in [Table 4](#), perceived usefulness influences attitude and behavioral intention to use an ILM more strongly for male students than it influences female students. Hypotheses 1 and 2 are statistically supported. The impact of perceived ease of use on attitude has the same effect on both male and female students. Hypothesis 3 is not supported. It is interesting to find that the impact of perceived enjoyment influences attitude more strongly for female students than it influences male students, whilst the impact of perceived enjoyment influences attitude more strongly for male students than it influences female students. Hypothesis 4 is not supported, but Hypothesis 5 is supported. Finally, as hypothesized, the effect of subjective norm on behavioral intention to use an ILM is more important for female students than for male students.

DISCUSSION AND CONCLUSION

Our research incorporated both the motivational perspective and social influence perspective into TAM, and postulated perceived usefulness, perceived enjoyment, and subjective norm as the key factors affecting student acceptance of an ILM. Since the intent of this study is to explore and investigate the gender differences in

student acceptance of an Internet-based learning medium, this study empirically demonstrated how gender affects the effects of perceived usefulness, perceived ease of use, perceived enjoyment, and subjective norm on student acceptance of an ILM. The measurement models were confirmed with adequate convergent and discriminant validity with respect to the measurement of all the constructs in the research model. The overall variance explained in the structural model was relatively high for both male and female groups. The results of this study reconfirm the general applicability of the TAM and the existence of a gender impact on the model. The implications for this study are noteworthy for both researchers and practitioners.

Theoretical Implications

The results of the current study indicate that TAM is indeed suitable for investigating IT adoption among student population, and the specific findings of applying the motivational perspective and social influence perspective to the research problem at hand provide us useful insights to the problem.

The results of this study are mostly consistent prior studies on gender differences in technology adoption. For instance, perceived usefulness and perceived enjoyment influence strongly to male students than female students in their intention to use an ILM, whereas, subjective norm exhibits a greater impact on female students in their intention to use an ILM than male students. Studies in sociology have demonstrated that women value connection and cooperation more than men (Meyers et al., 1997) and have more extensive social networks than men (Wellman, 1992; Walker, 1994). In addition, prior research has found that men spend more time on the Internet for entertainment and leisure than women (Weiser, 2000), where as women prefer using computer technologies to expand their social networks and keep in touch with others (Debrand and Johnson, 2008).

It is also interesting to find that the impact of perceived ease of use on their decision to use an ILM is indifferent between male and female students. One possible explanation is that the gender gap of using IT is closing. Both male and female students are growth up with the use of IT. Using the Internet-based learning medium is not particularly difficult for them, and thus the impact of ease of use on their attitude toward the use of an ILM is similar for both male and female students.

Practical Implications

The findings of the current study provide the practitioners (instructors or academic institutions) a salient guideline on the design and implementation of an Internet-based learning medium. Since there is a significant difference in student decision to use an ILM between both male and female students, the practitioners should pay attention to the hygienic factors for the two gender groups during the design process.

Female students adopt and use the ILM because of their significant referents, such as instructors, friends or classmates, instructors may encourage more online interaction. For instance, instructors may make use of online chat rooms and online

discussion forums of the ILM to foster student collaboration and create a sense of community. Students, especially female students may be inherently motivated to feel connected to others within a virtual environment. Creating a virtual community of students is therefore likely to improve their intention to use the online learning technology.

For male students, the functionality of an ILM, as well as the enjoyable feeling of using an ILM are important factors determining their decision to use an ILM. To encourage the adoption and use of an ILM, institutions or instructors should emphasize the unique features of a particular learning medium in facilitating the learning process. For instances, they can promote the ideas that an ILM facilitates them in accessing information anywhere, anytime, in or out of the classroom, learning in a self-paced and interactive way, having more instruction time with fewer resources, and assessing the most updated information on their topics. In addition, instructors should make good use of games, quizzes, and other creative approaches to instil more fun and interest in the learning process through the use of an ILM.

Limitations and Future Research

This study is subject to some potential limitations. First, to keep the model parsimonious, the proposed research model focuses on the original TAM and only adds perceived enjoyment and subjective norm in the current investigation. Though the model variance explained is relatively high (above 30% of the variance), future studies should continue to enrich the existing model by adding social technological factors, such as social presence, media richness, and the like.

Another limitation is that the data was collected in Hong Kong. Since gender effect is usually related with culture, our results bear validity only to the context in which this study was conducted. To gain a broader understanding of student acceptance behavior, additional research should be replicated in other countries with different cultures. The measure of gender as a dichotomous variable in this study is consistent with biological sex. However, prior studies have suggested that gender may also be considered as a psychological construct since men and women are not at bipolar extremes on the underlying dimensions captured by gender (Bem, 1981). Future studies could investigate gender differences in IT adoption based on femininity and masculinity to further understand how students make decision to use an ILM.

Because of the cross-sectional nature of the study, spurious cause-effect inferences may be presented. A longitudinal design is needed in the future for valid cause-effect influences. In addition, initial acceptance is only the first step toward the overall success of an IS implementation. It would also be interesting to examine the student continuance behavior.

NOTES

- ¹ Harris Interactive (2009) [http://www.harrisinteractive.com/NEWS/newsletters/clientnews/ Alloy_Media_Marketing_WiredCampus_Nov12_2009.pdf](http://www.harrisinteractive.com/NEWS/newsletters/clientnews/Alloy_Media_Marketing_WiredCampus_Nov12_2009.pdf)
- ² Pew Internet and American Life Project (2009) <http://www.pewinternet.org/Presentations/2009/52-Networked-Learners.aspx>

³ <http://techcrunchies.com/males-vs-females-internet-users-in-usa/>

⁴ http://www.emarketer.com/analysis/edemographics/20010409_edemo.html

REFERENCES

- Ahuja, M. K., & Thatcher, J. B. (2005). Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly*, 29(3), 427–459.
- Bagozzi, R. P., & Lee, K. H. (2002). Multiple routes for social influence: The role of compliance, internalization, and social identity. *Social Psychology Quarterly*, 65(3), 226–247.
- Bem, S. L. (1981). Bsri and gender schema theory: A reply to Spence and Helmreich. *Psychological Review*, 88, 369–371.
- Chau, P. Y. K. (1996). An empirical assessment of a modified technology acceptance model. *Journal of Management Information Systems*, 13(2), 185–204.
- Cheung, C. M. K., & Lee, M. K. O. (2010). A theoretical model of intentional social action in online social networks. *Decision Support Systems*, 49(1), 24–30.
- Chin, W. W. (1998). The partial least squares: Approach for structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295–336). Mahwah, NJ: Lawrence Erlbaum Associates.
- Chong, J. (1998). Crime indicators for alcohol and drug abuse. *Criminal Justice and Behavior*, 25(3), 283–305.
- Davis, F. D. (1993). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13, 319–339.
- 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.
- Davis, F. D., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22, 1111–1132.
- Debrand, C. C. (2008). Gender differences in email and instant messaging: A study of undergraduate business information systems students. *Journal of Computer Information Systems*, 48(3), 20–30.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.
- Deci, E. L., & Ryan, R. M. (1991). *A motivation approach to self: Integration in personality*. Lincoln, NE: University of Nebraska Press.
- Fornell, C., & Larcker, D. (1981). Structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Frankel, K. A. (1990). Women and computing. *Communications of ACM*, 33(11), 34–45.
- Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of email: An extension to the Technology Acceptance Model. *MIS Quarterly*, 21(4), 389–400.
- Hair, J. F., Black, W. C., Babin B. J., Anderson R. E., & Tatham R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Pearson Education Inc.
- Hussong, A. M., Curran, P. J., & Chassin, L. (1998). Pathways of risk for accelerated heavy alcohol use among adolescent children of alcoholic parents. *Journal of Abnormal Child Psychology*, 26(6), 453–466.
- Igbaria, M., Schiffman, S. J., & Wieckowshi, T. J. (1994). The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology. *Behaviour and Information Technology*, 13(6), 349–361.
- Jones, S. (2002). *The Internet goes to college: How students are living in the future with today's technology*. Pew Internet & American Life Project. Washington, DC.
- Kelman, H. C. (1958). Compliance, identification, and internalization: Three processes of attitude change. *Journal of Conflict Resolution*, 2(1), 51–60.
- Lee, Y. C. (2006). An empirical investigation into factors influencing the adoption of an e-learning system. *Online Information Review*, 30(5), 517–541.
- Lee, M. K. O., Cheung, C. M. K., & Chen, Z. H. (2005). Acceptance of internet-based learning medium: The role of extrinsic and intrinsic motivation. *Information & Management*, 42(8), 1095–1104.

- Lightdale, J. R., & Prentice, D. A. (1994). Rethinking sex differences in aggression: Aggressive behavior in the absence of social roles. *Personality and Social Psychology Bulletin*, 20, 34–44.
- Meyers, R. A., Brashers, D. E., Winston, L., & Grob, L. (1997). Sex differences and group argument: A theoretical framework and empirical investigation. *Communication Studies*, 48, 19–41.
- Ngai, E. W. T., Poon, J. K. L., & Chan, Y. H. C. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers & Education*, 48(2), 250–267.
- Odell, P. M. (2000). Internet use among female and male college students. *CyberPsychology & Behavior*, 3(5), 855–862.
- Quatman, T., & Watson, C. M. (2001). Differences in adolescent self-esteem: An exploration of domains. *The Journal of Genetic Psychology*, 162(1), 93–117.
- Selim, H. M. (2007). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education*, 49(2), 396–413.
- Shen, A. X. L., Lee, K. O. M., & Cheung, M. K. C. (2010). Gender differences in intentional social action: We-Intention to engage in social network-facilitated team collaboration. *Journal of Information Technology*, 25(2), 152–169.
- Shi, N., Lee, K. O. M., Cheung, M. K. C., & Chen, H. P. (2010). *The continuance of online social networks: How to keep people using facebook*. Hawaii International Conference on System Sciences, Kauai, Hawaii, USA.
- Straub, D. W., Keil, M., & Brenner, W. H. (1997). Testing the Technology Acceptance Model across cultures: A three country study. *Information Management*, 33(1), 1–11.
- Studlar, D. T., McAllister, I., & Hayes, B. C. (1998). Explaining the gender gap in voting: A cross-national analysis. *Social Science Quarterly*, 79(4), 779–798.
- Taylor, S. T., (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144–176.
- Teo, T. S. H. (2001). Demographic and motivation variables associated with Internet usage activities. *Internet Research*, 11(2), 125–137.
- Venkatesh, V. (1999). Creation of favorable user perceptions: Exploring the role of intrinsic motivation. *MIS Quarterly*, 23(2), 239–260.
- Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24(1), 115–139.
- Venkatesh, V., (2000). A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186–204.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003) User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.
- Walker, K. (1994). I'm no friends the way she's friends: Ideological and behavioral constructions of masculinity in men's friendships. *Masculinities*, 2, 38–55.
- Weiser, E. B. (2000). Gender differences in Internet use patterns and Internet application preferences: A two-sample comparison. *CyberPsychology & Behavior*, 3(2), 167–178.
- Wellman, B. (1992). *Men in networks: Private communities, domestic friendships*. London: Sage.
- Wilson, M. (2004). A conceptual framework for studying gender in information systems research. *Journal of Information Technology*, 19, 81–92.
- Wolfe, C. R. (2001). *Learning and teaching on the World Wide Web*. San Diego, CA: Academic Press.
- Zhang, K. K. Z., Lee, K. O. M., Cheung, M. K. C., & Chen, H. P. (2009). Understanding the role of gender in bloggers' switching behavior. *Decision Support Systems*, 47(4), 540–546.

Christy M. K. Cheung
 Hong Kong Baptist University
 Hong Kong SAR

Matthew K.O. Lee
 City University of Hong Kong
 Hong Kong SAR

APPENDIX A

Statistics developed by Wynne Chin to Compare Corresponding Paths

$$S_{\text{pooled}} = \sqrt{\left\{ \left[\frac{N_1 - 1}{N_1 + N_2 - 2} \right] \times SE_1^2 + \left[\frac{N_2 - 1}{N_1 + N_2 - 2} \right] \times SE_2^2 \right\}}$$

$$t_{\text{pooled}} = \frac{(PC_1 - PC_2)}{[S_{\text{pooled}} \times \sqrt{(1/N_1 + 1/N_2)}]}$$

where S_{pooled} is the pooled estimator for the variance

t_{pooled} refers to the t-statistic with $(N_1 + N_2 - 2)$ degrees of freedom

N_i is the sample size of dataset for culture i

SE_i is the standard error of path in structural model of culture i

PC_i is the path coefficient in structural model of culture i