EXPLORING THE FACTORS THAT INFLUENCE CONTINUANCE INTENTION TO ATTEND ONE-TO-SOME ONLINE COURSES VIA VIDEOCONFERENCING SOFTWARE

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ABSTRACT
Although videoconferencing software and equipment have been widely used in enterprises and education in recent year, few past studies experimentally examined the factors influencing users' continuous intention to attend one-to-some online courses via videoconferencing software in distance learning. In order to provide researchers with a better understanding of the determinants, this study developed a theoretical model based on social cognitive theory. Thirty university students were invited to attend a ten-week videoconferencing course and filled out an academic questionnaire after the courses. The results of the survey indicated that social environmental factors (normative belief and subjective norms) and personal factors (affect and performance outcome expectations) can significantly influence users' continuous intention. In particular, social environmental factors had the strongest direct and indirect effects. Furthermore, it is found that continuous intention significantly impacted students' learning effectiveness.

INTRODUCTION

With the development of World Wide Web services and the decreasing of the cost of high speed Internet, video capture and display technology, personal videoconferencing systems have become popular and affordable to general public. Through a desktop or laptop, a webcam, a videoconferencing software and Internet connectivity, Internet users can easily have a meeting or discussion with their friends online. In addition, some free videoconferencing programs, such as Skype or MSN Messenger, are used increasingly in education to bring teachers and students separated geographically together (Eroz-Tugˇa & Sadler, 2009). For example, eBay.com provides a premium service on a website, Skype Prime Directory, for their users to talk to an advisor on a voice or voice call using Skype (http://directory.skype.com/en/skypeprime). These programs are constantly evolving and can provide high quality of video and a few simple tools for users to interact.

Although the free videoconferencing programs have been used by a lot of Internet users and can be easily used to hold a meeting online, some of them only can provide one-to-one video conversations. They cannot be used to on an online one-to-some videoconferencing in education. Recently, a few some-to-some online videoconferencing programs are developed, such as CUworld and Camfrog Video Chat. These programs are more suitable for teachers to instruct some students simultaneously to save time cost. However, past researchers indicated that these programs are not as user-friendly as the free one-to-one videoconferencing programs (Eroz-Tugˇa & Sadler, 2009). Users may have more negative feelings towards theses programs while using them. Moreover, even though the online group videoconferences hold the advantages of saving teachers' instruction time cost and students' transportation cost, they in educational settings still have challenges (Gillies, 2008). Online videoconferencing needs stable high speed Internet and requires that users have to be online at a set time–different from some e-courses, which allow users to attend online courses wherever and whenever they wish (Bates, 2005, p. 180). Therefore, in order to exploit this technology to improve students' learning, what factors affecting users' continuance intention to attend one-to-some online classes via videoconferencing software merit further investigation.

Users' behaviors would be influenced by individual factors or environment situations. According to Social cognitive theory (SCT), behavior, environmental situations, and individual cognitive factors are affected by each other (Bandura, 1986). Education-related studies have used this theory to explain the adoption behavior of e-learning systems recently (Chu, 2010; Wu, Tennyson, & Hsia, 2010). Accordingly, SCT is adopted to interpret users' intention to attend online videoconferencing in this research. This study proposed a research model to investigate the main factors influencing attendance intention in an online videoconferencing environment. The proposed model is empirically validated, and the relationships among the variables will be examined as well.

Theoretical background and research hypotheses

SCT is widely accepted for validating individual behaviors. Many different types of research have applied it to develop a theoretical model to explain individuals' online behavior (M. Hsu, Ju, Yen, & Chang, 2007; Huang & Liaw, 2005; Tsai & Tsai, 2010). According to SCT, users' behaviors are affected by both individual cognitive factors and environmental factors (Wood & Bandura, 1989). Cognitive factors can be in the form of personal

cognition, affect and biological events. Environmental factors refer to the social or physical environments which can influence individuals' behaviors.

Regarding cognitive factors, SCT advances two sets of expectations as the major cognitive force leading behavior: (1) outcome expectations; and (2) expectation related to self-efficacy. SCT advocates that both expectations basically determine user behavior. Individuals tend to undertake the behaviors that they believe will result in a better outcome. Self-efficacy is defined as "People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Furthermore, the theory indicated that self-efficacy influences outcome expectations and outcome expectations also affect user behavior. In terms of environmental factors, past studies and research shows that the learning environment affects learners' behavior (Piccoli, Ahmad, & Ives, 2001; Wu et al., 2010). In the e-learning environment, the physical environments will include system functionality and content feature while the social environments can be learning climate or subjective norms (Wu et al., 2010). In particular, Subjective norms, as proposed by the Theory of Reasoned Action (TRA), can be defined as perceived social pressure – such as peer pressure or superior pressure – to perform or not perform a behavior (Fishbein & Ajzen, 1975).

Past research also indicated personal factors (self-efficacy and outcome expectations) and environmental factors (normative beliefs) will affect learning online community behaviors (Joe & Lin, 2008). It is found that outcome expectations and normative beliefs are the key factors directly influence the behavior while self-efficacy indirectly influences the behaviors through outcome expectations. Therefore, they are considered as important determinants in the research model. Furthermore, in online videoconferencing environment, the efficacy of the interactions among users will mainly depend on the interactivity functions. Interactivity could enhance online users' engagements and would increase the appeal of online services (Dubelaar, Leong, & Alpert, 2003; Ghose & Dou, 1998). By adding interactivity to an online platform, the designers could improve users' positive attitudes, such as affect and satisfaction (Lu, Lin, Hsiao, & Cheng, 2010). Consequently, Interactivity and affect are also considered as major factors in the model.

In the research model, it is proposed that affect, performance outcome expectations, and subjective norms are three major determinants of users' intention to attend online courses via videoconferencing platform, mainly based on SCT (Bandura, 1986). In addition, it is proposed that videoconferencing platform interactivity (human-system interactivity and human-human interactivity) will influence affect. Based on the earlier discussion, affect, performance outcome expectations, and learning self-efficacy belong to personal factors, whereas videoconferencing platform interactivity, normative belief, and subjective norms are attributed to environmental factors. The research model tested in this study is shown in Figure 1. The definitions of the constructs and the rationales for the proposed hypotheses are explained in the following sections.

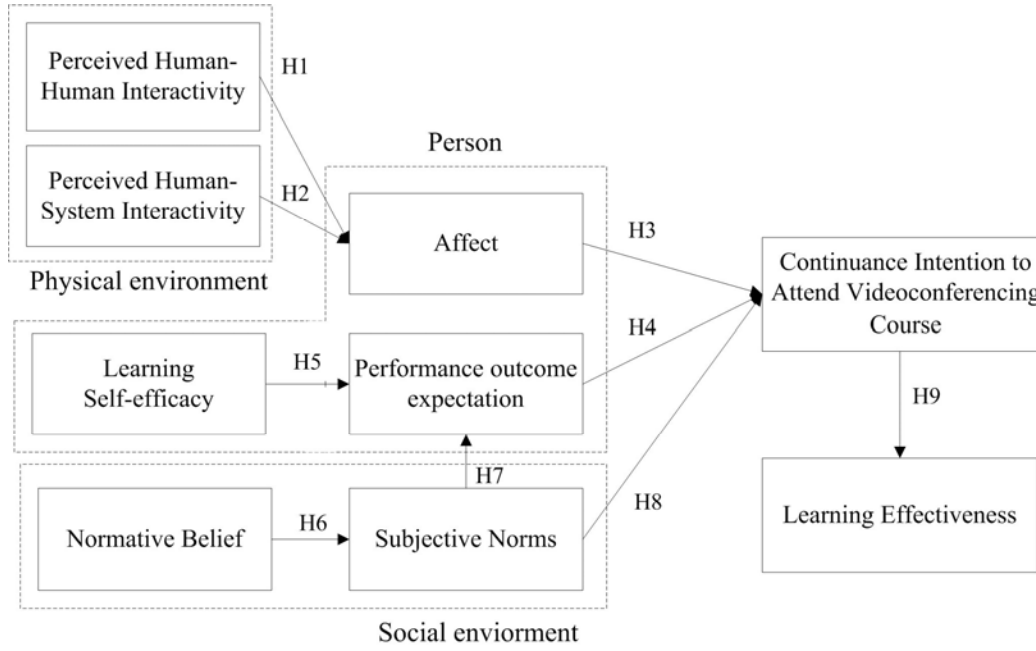

Figure 1. Research model

Interactivity

Past studies have demonstrated that interactivity could enhance users' engagements and users' positive attitudes toward a system or a website (Dubelaar et al., 2003; Ghose & Dou, 1998; Teoh & Neo, 2007). The element of interaction is one of the most important factors relating to e-learning (Moore, 2001). Much attention has been drawn to study the different types of interactivity in an online environment. Based on previous studies (Bouhnik & Marcus, 2006; Ha & James, 1998; Lee, 2005), the interactivity of a videoconferencing software can be categorized into two major types of interactions: (1) human - system interaction (HSI); (2) human - human interaction (HHI).

HSI is described as the degree to which users believe that they can easily use the videoconferencing system and acquire course-related information via interacting with the functions of the videoconferencing system, such as searching for the timetable or descriptions of the online course, looking up classmates or the recordings of the online course, and managing personal contacts. HHI is conceptualized as the degree to which users believe that they can easily communicate or exchange thinking with teachers or classmates via interacting with the functions of the videoconferencing system, such as text chat, interactive white board, and audio/video functions. Both HSI and HHI can help instructors and learners overcome psychological and communication gaps in the e-learning environment. Bouhnik and Marcus (2006) also demonstrated that increasing the interactions is an important factor in bridging the gaps between the instructors and learners.

Moreover, past studies showed that interaction among students and teachers is an important factor in the success of online courses (Picciano, 2002; Swan, 2001). For example, Swan's (2001) research result showed that the more interaction they thought they had with the instructor and their classmates, the more satisfied the students were, and the more they thought they leaned from the course. Picciano (2002) found that the amount of discussion which actually took place in an online course is related to the students' perceived learning. Therefore, if students can have more HSI and HHI via videoconferencing software, they would have more positive attitude toward the online videoconferencing. Consequently, the following hypotheses are proposed.

Hypothesis 1: The degree of affect is positively influenced by the degree of HSI.
Hypothesis 2: The degree of affect is positively influenced by the degree of HHI.

Affect

Affect (or liking), which is a kind of positive attitude, refers to liking or enjoying working on a specific activity. Attitudes are central to behavioral theory, as they are used to understand and predict behavior (Compeau & Higgins, 1995; Compeau, Higgins, & Huff, 1999; Fishbein & Ajzen, 1975). Based on behavioral theories (e.g., TRA, Technology Acceptance Model (TAM), Theory of Reasoned Action (TPB)), attitudes will influence users' intention to adopt technology. Moreover, recent research also showed that attitude would influence users' behaviors on the Internet (C. Hsu & Lu, 2007; Huang & Liaw, 2005).

In the education studies, researchers found that positive attitude, such as satisfaction and affect, influence users' adoption of web course tools or intention toward e-learning system as well (Lee, 2010; Ngai, Poon, & Chan, 2007; Park, 2009; Jan et al., 2012). For example, Park (2009) indicated that attitude would influence university students' behavioral intention to use e-learning. Lee (2010) demonstrated that satisfaction had strong effect on students' continuance intention. These findings led us to assume that students with higher affect on the videoconferencing software will have more continuance intention to attend videoconferencing course. Thus, the hypothesis is proposed:

Hypothesis 3: The degree of continuance intention is positively influenced by the degree of affect.

Performance outcome expectations

Outcome expectations are considered to be a main influence on users' behavior in the SCT model. SCT defined outcome expectations as the perceived consequences of performing a behavior. They are a strong force to guide individuals' perception and behavior. The influence of outcome expectations on a person can be positive or negative. Positive outcome expectations will establish self-satisfaction, pride and self-worth, while negative outcome expectations could lead to self-dissatisfaction and self-devaluation (Bandura, 1997).

According to past empirical evidence, outcome expectations are categorized into personal expectations and performance-related expectations (Compeau & Higgins, 1995; Compeau et al., 1999). Personal outcome expectations refer to the expectations of change in image or status or to the expectations of rewards. Performance-related outcomes relate to those associated with improvements in job performance associated with a specific behavior (Compeau et al., 1999). In this study, performance expectations are defined as the degree to

which a learner believes that attending videoconferencing courses will help him/her to attain gains in learning performance. Past research noted that performance-related outcomes have a relatively strong influence on the learning satisfaction with e-learning system or the usage of system (Compeau et al., 1999; Lee, 2010; Wu et al., 2010). Similarly, if learners believe that attending videoconferencing courses will result in positive benefits, they will have more intention to continuously use videoconferencing software to learn. Consequently, the following hypotheses are proposed.

Hypothesis 4: The degree of continuance intention is positively influenced by the degree of performance outcome expectations.

Learning self-efficacy

According to SCT, self-efficacy is one of the main cognitive variables affecting human behavior. If people feel that they have an ability to perform an action which can lead to positive results, they will be more willing to try. The greater the confidence individuals have about their ability to execute outcomes, the greater the probability of achieving their goal (Bandura, 1986) (Bandura, 1986). In addition, prior research shown that self-efficacy could improve initiative and lead to improved performance or outcome expectations (Compeau et al., 1999; Lee, 2010; Wu et al., 2010). In this study, learning self-efficacy is defined as the belief that a person has the capabilities to efficiently perform certain learning tasks which a course required. Accordingly, the following hypothesis is proposed:

Hypothesis 5: The degree of performance outcome expectations is positively influenced by the degree of learning self-efficacy.

Subjective norms

Subjective norms were introduced as an important antecedent variable of intentions by Fishbein and Ajzen (1975) in the TRA. As defined by Fishbein and Ajzen (1975), subjective norms describe "the degree to which an individual believes the people who are important to him/her expect him/her to perform the behavior in question", which are influenced by an individual's normative belief. The normative belief refers to an individual's perception about the particular behavior, which is affected by the opinions or beliefs of significant others (classmates, teachers, or friends). Subjective norms can be regarded as social normative pressures or encouragement. Compeau and Higgins (1995) also argued that the encouragement of others who are important to people can be expected to influence outcome expectations. If others encourage videoconferencing courses, the individual's assessment of the likely outcome of the attending behavior will be affected.

Additionally, in most cases, subjective norm is directly and significantly related to a person's intention to use information systems. Their influence on the usage of e-learning systems is direct and significant as well (Lee, 2010; Park, 2009). This means that social influence or social pressures play an important role in users' continuance intention to adopt e-learning systems. In addition, Hong et al. (2011) found that subjective norm will correlate with students' intention to play interactive moral online game, which help students explore and establish appropriate moral values. Similarly, in the videoconferencing courses, the expectations of students' classmates, friends, or teachers will affect their willingness to continuously attend the courses. Therefore, the following hypotheses are proposed:

Hypothesis 6: The degree of subjective norms is positively influenced by the degree of normative belief.
Hypothesis 7: The degree of personal outcome expectations is positively influenced by the degree of subjective norms.
Hypothesis 8: The degree of continuance intention is positively influenced by the degree of subjective norms.

Intention to persist

Although e-learning has been promoted to various levels of users, a few users still lack continuance intention to use such systems (Chiu, Sun, Sun, & Ju, 2007). Actual success of e-learning systems need users' continued usage. Through continued usage of e-learning systems, students' learning effectiveness can be improved. Past studies demonstrated that intention to use e-learning systems was positively related to e-learning effectiveness (Law, Lee, & Yu, 2010; Liaw, 2008). Students' learning effectiveness can be enhanced if they are willing to use e-learning systems to assist their learning. Consequently, the hypothesis is proposed:

Hypothesis 9: The degree of learning effectiveness is positively influenced by the degree of continuance intention.

RESEARCH METHOD

Participants

Thirty university students aged between 18 and 22 from a suburban university in Kaohsiung, Taiwan participated in the study. They were invited to attend ten-week online English learning courses (one-hour lesson per week) via a videoconferencing software, Joinnet. Joinnet is client software, connecting to multimedia meeting and messaging servers, for video conferencing, white-board presentation, synchronized web browsing, desktop, and application sharing. The students' English abilities have been tested by a TOEIC (Test of English for International Communication) test to make sure that their English abilities are in the same level. In the first lesson, the students first used the software and were taught how to use it. They were separated into six groups and attended the same online courses which were taught by the same teacher. There were five students in each course. Students can see their classmates' and the teacher's videos and talk each other synchronically via the software. The teacher taught the courses through electronic white board, video conferencing, and instant messaging functions of the software. In addition, the students attended a pre-test of English grammar before the online courses and a post-test after the ten-week courses. The multiple choice questions in the pre-test and post-test papers are developed by two English teachers. The questions and items in two test papers are very similar and evaluate the same English grammar knowledge. Moreover, they needed to fill out the questionnaire of this study after finishing the courses.

Instrument development

The questionnaire contained 19 self-reported items related to eight research constructs. In order to ensure content validity, items selected for the constructs were largely adapted from prior research. All the questionnaire items used a five-point Likert-type scale, ranging from (1) strongly disagree to (5) strongly agree. The scale items for learning self-efficacy were taken from Joo et al. (2000) with the wording slightly modified to fit the requirements of this study. Items for personal outcome expectations and affect were adapted from Compeau and Higgins (1999). Furthermore, normative beliefs and subjective norms were measured using the instruments of Venkatesh and Brown (2001) and Venkatesh and Morris (2000) respectively with modified wording to suit the context of videoconferencing. Perceived human-human Interactivity and human-system Interactivity were measured by six items developed from the study of Lu et al. (2010). The items to measure continuance intention to attend videoconferencing course were developed from past research (Hsu and Lin, 2008). Finally, learning effectiveness was measured by the difference in scores between the pre-test and post-test.

A pre-test were undertaken to validate the instrument. The pre-test involved four respondents who were experts in the field of e-learning. Respondents were asked to comment on the length of the instrument, the format, and wording of the scales. Eventually, comments from them led to a few minor modifications of the wording and the item sequence.

Data analysis

Partial least squares (PLS) analysis is used to conduct the proposed model and hypothesis testing. As in structural equation modeling (SEM), the PLS approach allows researchers to assess measurement model parameters and structural path coefficients simultaneously. Different from covariance-based SEM, PLS focuses on maximizing the variance of the dependent variables explained by the independent ones in place of reproducing the empirical covariance matrix (Haenlein & Kaplan, 2004). Additionally, PLS makes minimal demands in terms of sample size to validate a model compared to SEM. In our model, because all items are viewed as effects, not causes, of latent variables, they are modeled as reflective indicators. The sample size of PLS requires ten times the largest number of independent variables impacting a dependent variable or the largest number of formative indicators (Chin, 1998). In this study, the largest number of independent variables estimated for a dependent variable is three. Therefore, our sample size of 30 meets the requirement for the PLS estimation procedures.

Construct validity

Construct validity, including convergent and discriminant validity, is widely used to validate research constructs. Convergent validity can be assessed by examining composite reliability and average variance extracted from the measures (Hair, Anderson, Tatham, & Black, 1998). Many studies have used 0.7 as threshold reliability of the measures. Table 1 shows that all measures displayed high factor loadings, which are greater than 0.7, on their respective constructs. As shown in Table III, our composite reliability values range from 0.920 to 0.991, exceeding the threshold of 0.7 (Nunnally & Bernstein, 1994). Table 2 also shows that the average variances extracted from the constructs ranged from between 0.8 to 0.986, which are above the acceptability value 0.5 (Fornell & Larcker, 1981). Hence, the results demonstrate that the measurement items were reasonably convergent on their respective constructs.

As recommended by Fornell and Larcker (1981), the result in Table 3 confirms the discriminant validity: the square root of the average variance extracted for each construct exceeded the squared correlation between any pair of distinct constructs. The smallest square root of average variance extracted from the constructs (0.894) is apparently greater than the largest correlation between constructs (0.759). Consequently, the measurement model demonstrated adequate reliability, convergent validity and discriminant validity.

Table 1. Descriptive Statistics

Construct/ Indicators	**Mean**	**Std. Dev**	**Loading**
Affect (AFF)			
AFF1	3.90	0.80	0.92
AFF2	3.77	0.77	0.94
Perceived Human-Human Interactivity (HHI)			
HHI1	4.00	0.79	0.80
HHI2	4.13	0.73	0.96
HHI3	4.10	0.71	0.97
Perceived Human-System Interactivity (HSI)			
HSI1	3.90	0.89	0.82
HSI2	3.70	0.84	0.95
HSI3	3.90	0.80	0.91
Continuance Intention (INT)			
INT1	3.70	0.65	0.97
INT2	3.80	0.76	0.96
Normative Belief (NB)			
Norm1	3.77	0.68	0.95
Norm2	3.63	0.72	0.97
Norm3	3.60	0.72	0.96
Performance outcome expectation (POE)			
POE1	3.63	0.77	0.99
POE2	3.60	0.77	0.99
Learning Self-efficacy (LS)			
LS1	3.13	0.97	0.94
LS2	2.90	1.13	0.91
Subjective Norms (SN)			
SN1	3.57	0.68	0.99
SN2	3.60	0.68	0.99
Learning Effectiveness			
LE	7.50	6.04	1.00

Table 2. Analysis of convergent validity

Construct	**Cronbach's Alpha**	**Composite Reliability**	**Average Variance Extracted**
AFF	0.850	0.930	0.868
HHI	0.908	0.939	0.837
HIS	0.879	0.923	0.800
INT	0.918	0.961	0.924
POE	0.986	0.993	0.986
SE	0.827	0.920	0.852
SN	0.982	0.991	0.982
NB	0.956	0.973	0.919

Table 3. Analysis of discriminant validity

	AFF	**HHI**	**HIS**	**INT**	**POE**	**SE**	**SN**	**NB**
AFF	0.932							
HHI	0.433	0.915						
HIS	0.567	0.282	0.894					
INT	0.525	0.465	0.027	0.961				
POE	0.403	0.347	0.260	0.542	0.993			
SE	0.081	0.223	-0.135	0.342	0.376	0.923		
SN	0.512	0.485	-0.073	0.755	0.554	0.362	0.991	
NB	0.552	0.508	0.301	0.537	0.534	0.216	0.759	0.959

Note:
a) The diagonal elements show the square root of the average variance extracted.
b) The off diagonal elements show the correlations between constructs.

Structure model

This study employed PLS to test the research model with respect to proposed hypotheses testing. Consistent with recommendations (Chin, 1998), bootstrapping method was performed to determine the statistical significance of each path coefficient using t-tests. The results of the analysis are presented in Figure 2, and the standardized path coefficients and t-tests results are between constructs. The test results from the complete data sample supported the influence of HHI and HSI (physical environment) on the affect, supporting H1 and H2. As expected, H3 and H4 were supported in factors about person, but performance outcome expectations have stronger effect on the intention to attend videoconferencing courses. In addition, learning self-efficacy significantly influence performance outcome expectations, supporting H5. In social environment, normative belief had strong effect on subjective norms, and performance outcome expectations and the intention were significantly influenced by subjective norms. Hence, H6, H7 and H8 were supported. Moreover, the results show that the attendance intention positively affect learning effectiveness (students' grades), supporting H9. Overall, the research model explained 61.1 percent of the variance in intention of attending videoconferencing courses.

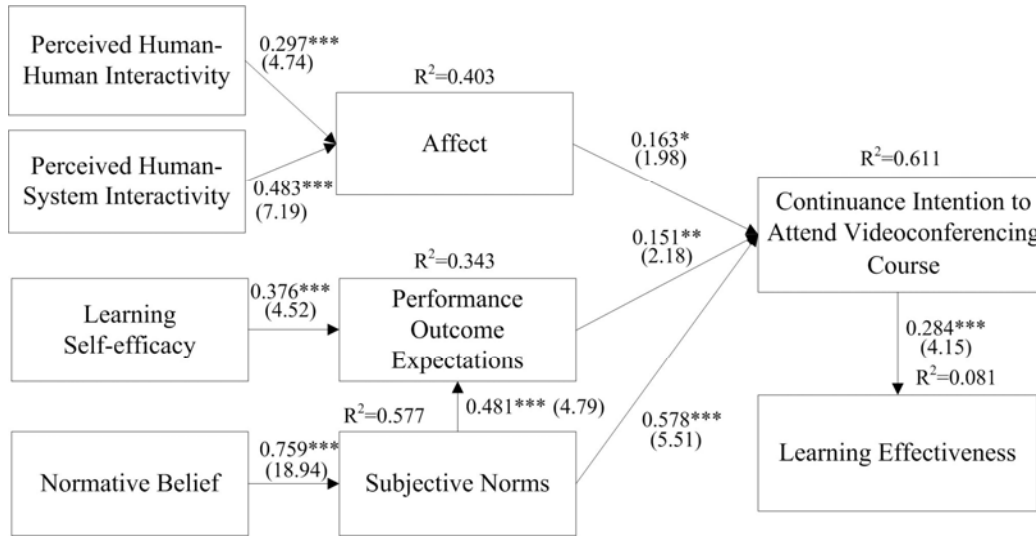

Figure 2. Analysis results

DISCUSSION

The research presented in this paper investigated the impact of person, physical and social environment factors on the intention to attend videoconferencing courses. It is found that all of the hypotheses were supported. The findings are discussed below.

First, among personal factors, affect and personal outcome expectations appear to be a significant determinant of continuance intention to attend videoconferencing courses. Compare with personal outcome expectations (β=0.151), affect seems to have more influence (β=0.163) on the intention. Consistent with past studies and our hypotheses, the results demonstrate that students (users) who have more positive attitude toward the videoconferencing software will have more intention to attend the courses. It means that the features of a videoconferencing software should cause users' affect in order to increase their continuous usage intention. Moreover, it was found that learning self-efficacy influence the intention indirectly through personal outcome expectations. Students with higher learning self-efficacy will have more personal outcome expectations and be more possible to continuously attend the courses. Therefore, teachers could provide students in need with educational programs that help improve their learning self-efficacy.

Second, the results show that HHI and HSI (physical environment factors) are important determinants of affect. In particular, HSI influence affect more significantly. It demonstrates that ease of using the videoconferencing system and acquiring course-related information via interacting with the features of the videoconferencing system is essential. The features can assist users in managing their learning records and course information in videoconferencing courses. Furthermore, it was found that ease of communicating with others via the features of HHI can enhance users' affect. For example, the functions of electronic white board and instant message allow

users to communicate easily with each other via one-to-one, one-to-many, even many-to-many communication and then will improve affect. Consequently, because interactivity in videoconferencing courses mainly depends on the functions, software designers should continuously improve the efficiency and effectiveness of HHI and HSI.

Third, social environment factors (normative belief and subjective norms) directly and indirectly impact personal outcome expectations and continuous attending intention. Subjective norms had strongest direct effect (0.578) on the intention, and the indirect effect of normative belief is strongest (0.759X(0.578+(0.481X0.151))=0.494). This highlights the critical role of normative belief and subjective norms in the attending intention. The results indicate that social environment factors seem to be the most influential determinants in videoconferencing courses. In the school environment, normative belief and subjective norms mainly come from teachers and classmates. Therefore, in order to increase the usage intention, teachers' and classmates' believes about the videoconferencing courses are very critical.

Finally, it was found that the intention would positively influence students' grades. It means that videoconferencing courses can improve students' learning intention and learning effectiveness although only 8.1 percent of the variance in students' grades was explained. Therefore, videoconferencing courses can be a good learning solution to save students' time for commute.

This study suffers from several limitations. First, the questionnaire survey was conducted using a self-reporting scale to measure most of the research variables, and thus may be subject to a method bias. Second, our research participants were the university students in Taiwan; thus further research is needed to generalize our findings. Third, because of the limitation of teaching resources, only 30 students were invited to attend the courses. The model can be further examined by inviting more different students in the future. Finally, because only 8.1 percent of the variance in students' grades was explained, it means that other more influential determinants may exist. Further research can explore other factors affecting students' learning effectiveness in videoconferencing courses in the future.

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