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The factors that predispose students to continuously use cloud services: Social and technological perspectives

Yong-Ming Huang

Department of Applied Informatics and Multimedia, Chia Nan University of Pharmacy and Science, Tainan City, Taiwan, ROC

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ABSTRACT

Cloud services have been widely used in education in recent years. However, the factors that determine students' continuance intention to use such services have received surprisingly little scholarly attention. Previous studies have shown that students may discontinue using a specific technology even if they have initially accepted it. Therefore, this research seeks to identify what factors may influence students' continuance intention to use cloud services. This research not only developed a research model by incorporating social and technological factors but also tested a series of hypotheses derived from the model. Our research findings suggest that (1) attitude toward using is the most important factor behind students' continuance intention to use cloud services; (2) social presence is the most significant factor that directly influences students' attitude toward using cloud services; (3) perceived ease of use plays a more important role than perceived usefulness in influencing students' attitude toward using cloud services.

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1. Introduction

Cloud services have been widely used in education (González-Martínez, Bote-Lorenzo, Gómez-Sánchez, & Cano-Parra, 2015). They are rendered on the basis of cloud computing, a promising paradigm. Regarding the pool of various resources (e.g., software) as a cloud, the paradigm has developed these resources into a riotous profusion of services such as Google Docs (document service), Prezi (presentation service) and Dropbox (file hosting service) and then delivers them over the Internet (Arpaci, Kilicer, & Bardakci, 2015; Huang, Wang, Guo, Shih, & Chen, 2013; Lee, Lee, & Kim, 2013). These services enable teachers to develop their teaching scenarios by using free or low-cost schemes rather than expensive proprietary productivity tools (Huang et al., 2013). More importantly, these services have considerable potential to realize certain pedagogies such as collaborative learning (González-Martínez et al., 2015). For example, Al-Zoube (2009) suggested that Google Docs is useful to realize collaboration among students, because it enables students to easily distribute documents to others and manage different versions of each document. Similarly, Huang (2015) used Prezi, a cloud-based presentation service, to help students edit a shared slide online synchronously. With the support of Prezi, students can not only work collaboratively, but also discern immediately any change made by others.

Nevertheless, only a few studies have systematically explored the factors that affect students' continuance intention to use cloud services from social and technological perspectives. In fact, students' continuance intention has been gradually viewed as an important indicator for the value of an educational technology (Lee, 2010; Lin, 2011) because students may discontinue

E-mail address: ym.huang.tw@gmail.com.

using the technology even if they have initially accepted it (Lee, 2010). As a result, examining students' continuance intention has become a vital issue nowadays. However, a majority of literature still focused simply on students' intention to use these services (Arpaci et al., 2015; Cheung & Vogel, 2013; Conde, García, Rodríguez-Conde, Alier, & García-Holgado, 2014; Huang, 2015; Taylor & Hunsinger, 2011). Tan and Kim (2011) conducted a pioneering study. They employed Google Docs to support students in collaboratively completing a group project and further revealed that perceived usefulness and satisfaction are significant factors behind their continuance intention to use the technology. However, they did not examine the influence of social factors on students' continuance intention to use cloud services. So far, social factors such as social influence have been viewed as significant determinants of using cloud services (Cheung & Vogel, 2013; Huang, 2015); besides, they may play an important role in influencing students' continuance intention to use such services. The deficiency in the existing literature indicates the critical need for exploring the factors that influence students' continuance intention to use cloud services from a more comprehensive perspective.

To this end, this research developed a research model by incorporating social and technological factors. Specifically speaking, this research firstly adopted Google Docs to support the subjects in collaboratively writing animation scripts, and then designed a questionnaire regarding their opinions on Google Docs so as to examine what factors affect their continuance intention to use this service. Finally, a series of analyses were performed to clarify how and to what degree the social and technological factors prompted the subjects to continue using Google Docs. The findings from these analyses provide researchers and instructors with practical knowledge that helps them develop and apply cloud services in different educational contexts.

2. Theoretical background and related studies

2.1. Theoretical background

Understanding the factors that influence users' intention to use information systems (IS) has been viewed as an important issue. Previous related studies mainly concentrated on the investigation of users' initial intention. These studies widely employed the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), the theory of planned behavior (TPB) (Ajzen, 1985, 1991) and the technology acceptance model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) as a theoretical basis to explain user acceptance of IS. Developed by Fishbein and Ajzen (1975), TRA suggests that attitude and subjective norm significantly influence behavioral intention, which in turn affects actual behavior. According to this theory, attitude refers to "a person's general feeling of favorableness or unfavorableness toward some stimulus object" (Fishbein & Ajzen, 1975: 216), subjective norm refers to "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975: 302), and behavioral intention refers to "a person's subjective probability that he will perform some behavior" (Fishbein & Ajzen, 1975: 288). Proposed by Ajzen (1985, 1991), TPB adds perceived behavioral control to TRA as the third factor. Perceived behavioral control refers to "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991: 183), which is postulated to affect behavioral intention and actual behavior. TAM was adapted from TRA by Davis et al. (Davis, 1989; Davis et al., 1989). They added perceived ease of use and perceived usefulness to illustrate user acceptance of IS. Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989: 320), while perceived usefulness refers to "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989: 320). TAM and TRA are similar in holding that the actual use of IS is determined by behavioral intention, and behavioral intention is determined jointly by attitude toward using and perceived usefulness. In addition, attitude toward using is influenced jointly by perceived ease of use and perceived usefulness, while perceived usefulness is significantly influenced by perceived ease of use.

2.2. Related studies on users' continuance intention to use IS

Later, researchers in this field gradually shifted their focus onto the investigation of users' continuance intention, and widely employed the IS continuance model. Developed by Bhattacherjee (2001), this model comprises four main constructs, namely confirmation, perceived usefulness, satisfaction, and IS continuance intention (Bhattacherjee, 2001). Confirmation originated from expectation confirmation theory (Oliver, 1980), which means that users have specific expectations of a particular product before using it, and then actually use it and compare its performance with their expectations, and finally determine the degree to which their expectations are confirmed (Bhattacherjee, 2001). Satisfaction implies that "a psychological or affective state related to and resulting from a cognitive appraisal of the expectation-performance discrepancy (confirmation)" (Bhattacherjee, 2001: 354). IS continuance intention refers to the degree to which a person is willing to continue using an information system (Bhattacherjee, 2001). Based on the definitions of these constructs, Bhattacherjee (2001) formulated the following hypotheses: (1) confirmation positively and significantly affects perceived usefulness and satisfaction; (2) perceived usefulness positively and significantly affects satisfaction and IS continuance intention; and (3) satisfaction positively and significantly affects IS continuance intention. Due to the successful development of the IS continuance model, many educational researchers have applied and modified the model to carry out relevant studies (Roca & Gagné, 2008; Shin, Shin, Choo, & Beom, 2011; Smith & Sivo, 2012; Tao, Cheng, & Sun, 2009), in which technological factors such as perceived ease of use and perceived usefulness are frequently identified as the determinants of users' continuance

intention to use IS. For example, perceived ease of use and perceived usefulness have been identified as important factors that directly affect students' continuance intention to use e-learning (Roca & Gagné, 2008). Similarly, perceived ease of use and perceived usefulness have been scientifically proved as critical determinants of teachers' continuance intention, for they directly encourage teachers to continue using e-learning (Smith & Sivo, 2012). In addition, some studies focused on exploring the indirect influence of the two factors on users' continuance intention. For instance, Lee (2010) suggested that perceived ease of use and perceived usefulness have an indirect influence on users' continuance intention to use e-learning through the mediation of attitude toward using. Similarly, Wu and Zhang (2014) argued that users' continuance intention to use e-learning 2.0 systems is indirectly influenced by perceived ease of use and perceived usefulness, in which attitude toward using plays a mediating role.

Social factors such as social influence and social presence have also been frequently adopted in explaining users' continuance intention to use IS (Cheng, 2014; Park & Lee, 2010; Park, Oh, & Kang, 2012; Smith & Sivo, 2012). Social influence refers to users' thoughts, attitudes, or decisions influenced by others, which is essentially the same as subjective norms (Cheng, 2014; Huang, 2015). Social presence refers to "the degree to which a person is perceived as a 'real person' in mediated communication" (Gunawardena & Zittle, 1997: 9). For example, social presence was adopted as one of the influential factors to explore why students are willing to continue using Twitter, and it was found more significant than perceived ease of use in directly influencing students' continuance intention (Park & Lee, 2010). Based on perceived ease of use and perceived usefulness, social presence was also found to be one of the determinants of teachers' intention to continue using e-learning (Smith & Sivo, 2012). Some studies paid particular attention to the impact of social influence on users' continuance intention. For example, Lee (2010) found that subjective norms indeed have a direct influence on users' continuance intention toward e-learning. Cheng (2014) also used subjective norms to explore nurses' continuance intention to use a blended e-learning system, through which subjective norms have been proved as a significant factor that directly affects not only nurses' continuance intention but also their perception of usefulness of the system. Similar findings can be seen in Sun, Liu, Peng, Dong, and Barnes (2014), who showed that social influence directly prompts users to continue using social networking services.

2.3. Related studies on users' initial intention to use cloud services

With the popularization of cloud services, several studies have explored the factors that affect users' initial intention to use cloud services in educational contexts. For example, Taylor and Hunsinger (2011) used TPB to examine what factors may affect students' intention to use Google Docs, and suggested that the three constructs of TPB, namely attitude, subjective norm and perceived behavioral control, have significant influences on students' intention to use Google Docs. Focusing on the aspects of security and privacy, Arpaci et al. (2015) developed a research model on the basis of TPB to investigate the factors that affect students' intention to use cloud services such as Google Drive. Their results showed that perceived security and privacy positively influence students' attitude which directly determines their behavioral intention to use cloud services. In addition, some studies primarily applied TAM to exploring students' intention of using cloud services. For instance, Cheung and Vogel (2013) developed a research model on the basis of TAM to examine what factors may influence students' intention to use cloud services such as Google Docs and Google Sites. Their research findings suggested that attitude and peer influence are the two most important factors behind students' intention to use cloud services. Similarly, Conde et al. (2014) employed TAM to analyze what factors prompt students to use Dropbox to share information and achieve collaboration, and identified attitude, perceived ease of use, and perceived usefulness as the key factors. Similar findings can be found in Huang (2015) who explored the decisive factors behind students' intention to use Prezi in conducting a collaborative survey. He also developed a research model by adding facilitating conditions and social influence to TAM as additional factors. The results of his study suggested that attitude and social influence play important roles in determining students' intention to use Prezi.

Despite the considerable efforts devoted, the aforementioned studies did not touch upon the decisive factors behind students' continuance intention to use cloud services from social and technological perspectives. The literature review has indicated that the social and technological factors are vital determinants of users' intention to continue using cloud services. However, no study has sought to integrate the two types of factors into a more comprehensive model to address the issue. To remedy this deficiency, this research further integrated the two types of factors, and thoroughly examined their influences on students' continuance intention to use cloud services, which is an approach rarely employed in other researches in the field. The next section elaborates on the details of the research design.

3. Research model and hypothesis

According to the literature review in Section 2, we specifically developed a research model to explore the factors that influence students' continuance intention to use cloud services. This research contributes to the growing body of studies on users' intention to use educational IS by introducing and confirming the influence of social and technological factors as an external variable on students' continuance intention to use cloud services. Fig. 1 shows the research model, and the eleven hypotheses were accordingly formulated and explained below.

Perceived ease of use and perceived usefulness have been widely employed to examine users' continuance intention (Roca & Gagné, 2008; Shin et al., 2011; Smith & Sivo, 2012; Tao et al., 2009). Previously, perceived usefulness was used in IS continuance model, suggesting that perceived usefulness significantly affects continuance intention (Bhattacharjee, 2001). Later, researchers added perceived ease of use as another significant factor, exploring the relationships among perceived ease

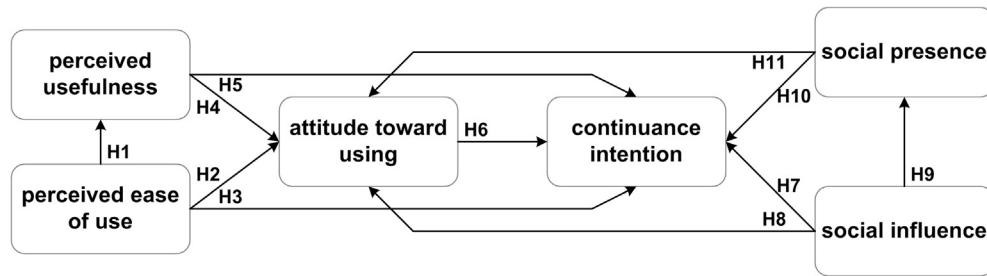


Fig. 1. Research model.

of use, perceived usefulness, attitude toward using, and continuance intention. For example, [Roca and Gagné \(2008\)](#) showed that continuance intention is directly and significantly affected by perceived ease of use and perceived usefulness, in which perceived ease of use directly influences perceived usefulness. Similarly, [Smith and Sivo \(2012\)](#) revealed that perceived ease of use and perceived usefulness have direct and significant influences on continuance intention. [Sun et al. \(2014\)](#) also showed that perceived ease of use and perceived usefulness directly and significantly affect continuance intention, in which perceived ease of use has a direct and significant influence on perceived usefulness. Some studies further examined the mediating influence of attitude toward using. For instance, [Lee \(2010\)](#) showed that attitude toward using plays a mediating role among perceived ease of use, perceived usefulness, and continuance intention. Similar results can be found in [Lin \(2011\)](#) as well as [Wu and Zhang \(2014\)](#). They consistently revealed that perceived ease of use significantly affects perceived usefulness, and perceived ease of use and perceived usefulness significantly affect attitude toward using, which in turn affects continuance intention. Accordingly, the first six hypotheses are formulated as follows:

- H1.** Perceived ease of use has a positive effect on perceived usefulness.
- H2.** Perceived ease of use has a positive effect on attitude toward using.
- H3.** Perceived ease of use has a positive effect on continuance intention.
- H4.** Perceived usefulness has a positive effect on attitude toward using.
- H5.** Perceived usefulness has a positive effect on continuance intention.
- H6.** Attitude toward using has a positive effect on continuance intention.

Social influence and social presence are also widely employed to examine users' continuance intention. For example, [Lee \(2010\)](#) and [Lee and Tsai \(2010\)](#) adopted social influence to explain users' continuance intention respectively in using e-learning and playing online games. They consistently found that social influence directly and significantly affects the users' continuance intention. In addition, some studies were carried out to examine the relationships among social influence, attitude toward using, and continuance intention. For instance, [Hernandez, Montaner, Sese, and Urquizu \(2011\)](#) found that social influence significantly affects attitude toward using, which in turn indirectly affects users' continuance intention to use information and communication technologies such as blogs. Similar results can be found in [Hamari and Koivisto \(2013\)](#), who showed that users' continuance intention is directly influenced by attitude toward using which in turn is directly affected by social influence. Researchers also tried to explore the relationships among social influence, social presence, and attitude toward using. [Allagui and Lemoine \(2008\)](#) proposed that social presence directly affects the attitude toward an e-commerce website. [Campbell, Wright, and Clay \(2010\)](#) further proved that social presence has a significant influence on the attitude toward online advertising. Similar result can be found in [Papachristos, Vrellis, Natsis, and Mikropoulos \(2014\)](#) who indicated that social presence is positively correlated to the attitude toward virtual environment. In addition, [Park and Lee \(2010\)](#) as well as [Smith and Sivo \(2012\)](#) revealed that social presence has a direct influence on users' continuance intention. Recently, [Ogara, Koh, and Prybutok \(2014\)](#) proved that social influence plays a direct and significant role in influencing social presence. Specifically speaking, social presence is particularly about an individual's feeling of interaction with real people, while social influence is, by definition, more about the influence from those who are important to the individual. In this sense, social presence does not guarantee social influence because users may not be necessarily influenced by a real person even if they detect the person's presence. On the contrary, social influence may affect social presence because only those who are important to the users may exert influences on them, and then the users may detect the presence of those important people. Besides, the more profoundly the users are influenced by those important people, the more quickly and clearly the former detect the presence of the latter. Accordingly, the last five hypotheses are formulated as follows:

- H7.** Social influence has a positive effect on continuance intention.
- H8.** Social influence has a positive effect on attitude toward using.
- H9.** Social influence has a positive effect on social presence.
- H10.** Social presence has a positive effect on continuance intention.
- H11.** Social presence has a positive effect on attitude toward using.

4. Research design

4.1. Participants

The subjects who volunteered to participate in this research were 125 students enrolled at a university in Tainan, Taiwan. We obtained 106 valid responses, which produced a response rate of 84.8 per cent. Their average age was 18.4 years old, with an average of 9.9 years' experience in using computers and 9.2 years' experience in using the Internet. All the subjects in this research had considerable experience in using information technology.

4.2. Cloud service

In this research, Google Docs was used as a tool for the students to collaboratively write their animation scripts. Google Docs is a kind of cloud service that provides users with an online document service. Google Docs has been indicated to be useful for collaboration, because it provides users with two vital functions, namely synchronous collaboration and records of revisions (Pilkington & Sanders, 2014). With the support of the two functions, the students could not only synchronously edit a shared file online, but also see what changes are made by whom and at what time. Accordingly, Google Docs was used for supporting the students' collaboration.

4.3. Experimental procedure

At the start of the experimental procedure, the students took part in a learning activity, by which they learned about the production of animation. After the learning activity, the students were randomly divided into several groups, each with three or four members, and were asked to produce an animation. The students in each group first discussed the topic of their animation and then used Google Docs to co-write the animation script according to their discussion. On a more specific basis, the students in each group can use their respective computers to co-write their animation script in terms of its title, characters, dialogues, scenes or frames. Different from traditional tools, Google Docs allows students to modify the animation script collaboratively and detect others modifications in real time immediately, which fosters their effective collaboration in writing animation scripts. Afterwards, the students employed an animation tool to create their animation based on their script. Finally, when the animation was completed, the students were asked to fill in the questionnaire, from which the validity of our research model and hypotheses can be examined.

4.4. Measurement

A structured questionnaire was developed based on an extensive review of prior studies (Bhattacharjee, 2001; Cheung & Vogel, 2013; Kreijns, Kirschner, Jochems, & Van Buuren, 2004; Venkatesh, Morris, Davis, & Davis, 2003). The questionnaire included six constructs, namely perceived ease of use, perceived usefulness, social influence, social presence, satisfaction, and continuance intention. Table 1 shows the final questionnaire that was distributed to the students, who were asked to indicate their level of agreement with the statements using a seven-point Likert scale.

Table 1
The final questionnaire.

Construct	Item	Reference
Perceived ease of use	(PEU1) I think that Google Docs is easy to use.	Venkatesh et al. (2003)
	(PEU2) I think that the functions of Google Docs are clear and understandable.	
	(PEU3) Learning to operate Google Docs is easy for me.	
Perceived usefulness	(PU1) I think that Google Docs is useful to assist me in writing a script.	Venkatesh et al. (2003)
	(PU2) I think that Google Docs is useful to assist me in writing a script more quickly.	
	(PU3) If I use Google Docs, I can write a better script.	
Social influence	(SI1) Students who influence my behavior think that I should use Google Docs.	Cheung & Vogel, 2013; Venkatesh et al. (2003)
	(SI2) Students who are important to me think that I should use Google Docs.	
	(SI3) Students around me who have good performance have benefited by using Google Docs.	
Social presence	(SP1) When I write a script with my classmates in Google Docs, I seem to feel that my classmates are on my side.	Kreijns et al. (2004)
	(SP2) When I write a script with my classmates in Google Docs, I feel that there is a feeling of actual face-to-face collaboration.	
	(SP3) When I write a script with my classmates in Google Docs, I feel that I deal with real persons and not with abstract anonymous persons.	
Attitude toward using	(AT1) I like using Google Docs to write a script.	Venkatesh et al. (2003)
	(AT2) I think that using Google Docs is a good idea.	
	(AT3) I think that Google Docs makes the writing of script more interesting.	
Continuance intention	(CI1) I intend to continue using Google Docs.	Bhattacharjee (2001)
	(CI2) My intentions are to continue using Google Docs than use any alternative means.	

5. Results

The partial least squares (PLS) approach was adopted to analyze the questionnaire data. It is a multivariate analysis suitable for exploring the relationships among a set of factors. PLS approach is also more suitable than structural equation modeling (SEM) for analyzing cases of a small sample size (Chin & Newsted, 1999). Specifically speaking, the necessary minimum sample size for PLS approach to yield reliable results is either ten times the number of items of the most complex construct, or ten times the number of independent variables that impact the most complex dependent variable (Chin, 1998). In this research, the most complex construct, such as perceived ease of use, involves 3 items, and the most complex dependent variable, namely continuance intention, is impacted by 5 independent variables. Accordingly, the minimum sample size for PLS approach is 50, a number clearly smaller than the sample of $N = 106$ valid responses analyzed in this research. The SmartPLS 2.0 software was employed in this research to perform the approach (Ringle, Wende, & Will, 2005), which includes the measurement and structural models.

5.1. Measurement model

This research assessed the measurement model in terms of item loadings, convergent validity, reliability of measures, and discriminant validity. An item would be viewed as reliable if its loading is greater than 0.70 (Chin & Newsted, 1999). We employed the average variance extracted (AVE) to assess the convergent validity, and the value has to exceed the standard minimal level of 0.5 to make the assessment significant and acceptable (Hair, Black, Babin, Anderson, & Tatham, 2006). The reliability of measures was evaluated by composite reliability with its minimum value of 0.7 and Cronbach's alpha with its minimum value of 0.6 (Hair et al., 2006). The discriminant validity was assessed by the square root of AVE and latent variable correlations. To make the assessment significant and acceptable, each construct's square root of AVE must exceed its correlation coefficient with the other constructs in the model (Fornell & Larcker, 1981). In addition, the discriminant validity was also confirmed as all item loadings are greater than their cross-loadings on all other constructs. Tables 2–5 indicate that the results delivered by the measurement model are significant and acceptable, since all the values meet the required standards.

5.2. Structural model

Based on the path coefficients and R^2 values, this research used a structural model to test the hypotheses (Chin & Newsted, 1999). The R^2 values indicate the model's ability in explaining the variation in the dependent variables, while the path coefficients serve as the indicator for the statistical significance of these hypotheses. Fig. 2 shows the results of the structural model. It implies that the structural model explains 61% of the variation in perceived usefulness, 48% in social presence, 77% in attitude toward using, and 75% in continuance intention. Fig. 2 also illustrates the eleven path coefficients among the constructs of the model that correspond to the eleven hypotheses formulated in this research. The results highlight the rejection of H3, H5, H7 and H10 as well as the confirmation of the other seven hypotheses.

This research summarized the direct, indirect, and total effects of each construct on continuance intention and attitude toward using in Table 6 to facilitate the exploration of the factors that significantly predispose the students to continue using Google Docs. Table 6 reveals that the dominant factor behind the students' continuance intention is attitude toward using with total effects of 0.82, followed by perceived ease of use (total effects = 0.36), social influence (total effects = 0.35), social presence (total effects = 0.34), and perceived usefulness (total effects = 0.21). Table 6 also shows that the dominant factor

Table 2
The item loadings of the measurement model.

Construct	Items	Loading	Standard deviation	Standard error	T-value
Perceived ease of use	(PEU1)	0.93	0.01	0.01	75.26
	(PEU2)	0.96	0.00	0.00	208.08
	(PEU3)	0.94	0.01	0.01	135.93
Perceived usefulness	(PU1)	0.90	0.01	0.01	73.47
	(PU2)	0.93	0.01	0.01	139.11
	(PU3)	0.90	0.01	0.01	86.28
Social influence	(SI1)	0.92	0.01	0.01	92.91
	(SI2)	0.90	0.01	0.01	75.19
	(SI3)	0.91	0.01	0.01	88.32
Social presence	(SP1)	0.88	0.01	0.01	84.11
	(SP2)	0.89	0.01	0.01	78.38
	(SP3)	0.83	0.03	0.03	31.38
Attitude toward using	(SA1)	0.88	0.03	0.03	30.28
	(SA2)	0.94	0.01	0.01	138.47
Continuance intention		0.93	0.01	0.01	121.46
	(CI1)	0.92	0.01	0.01	134.71
	(CI2)	0.84	0.04	0.04	23.52

Table 3
The convergent validity and reliability of measures of the measurement model.

Construct	Convergent validity	Reliability	
	AVE	Composite reliability	Cronbach's alpha
Perceived ease of use	0.89	0.96	0.94
Perceived usefulness	0.83	0.94	0.90
Social influence	0.83	0.94	0.90
Social presence	0.76	0.90	0.84
Attitude toward using	0.84	0.94	0.90
Continuance intention	0.78	0.88	0.73

behind attitude toward using is social presence with total effects of 0.41, followed by perceived ease of use (total effects = 0.40), social influence (total effects = 0.38), and perceived usefulness (total effects = 0.25).

6. Discussion

Fig. 2 shows the first finding of this research; that is, the influence of attitude toward using on users' continuance intention is far more direct and significant than those of other factors. In fact, attitude toward using has gradually been regarded as an important intervening variable in influencing users' continuance intention. Previous studies on continuance intention tended to treat satisfaction as the primary intervening variable (Bhattacharjee, 2001; Shin et al., 2011; Tan & Kim, 2011; Tao et al., 2009), while recent studies have shifted the focus onto attitude toward using and revealed its significant mediating effect on users' continuance intention (Lee, 2010; Lin, 2011; Rodríguez-Ardura & Meseguer-Artola, in press; Wu & Zhang, 2014). Attitude toward using refers to the degree to which a person prefers a particular technology (Fishbein & Azjen, 1975). Users would continue to use the technology if they perceive it positively; otherwise they would stop using it. Lee (2010) has proved that users' attitude toward using e-learning has a significant influence on their continuance intention to use the technology. In other words, users would continue to use e-learning if they perceive it positively. Based on the models they developed respectively, Rodríguez-Ardura and Meseguer-Artola (in press) as well as Wu and Zhang (2014) also identified that attitude toward using is the most significant factor behind users' continuance intention. Fig. 2 also shows that perceived ease of use, perceived usefulness, social influence, and social presence are the factors that have indirect influences on users' continuance intention through the mediation of attitude toward using. In other words, the students' continuance intention to use Google Docs was influenced by their own attitude toward the service, which was in turn influenced by the benefits that the service offered to them. For example, Google Docs provided the students with an easy-to-use collaborative function (i.e., perceived ease of use) that immersed them in an environment in which all members were indeed writing the script collaboratively (i.e., social presence). Google Docs brought the students these benefits, and thereby directly influenced their attitude toward using and their continuance intention to use it. More importantly, Google Docs was easily available to the students wishing to use it, which was why their attitude toward using significantly influenced their behavioral intention. This result differs from those reported by Chiou, Lin, Perng, and Tsai (2009) as well as Davis et al. (1989) who identified that attitude toward using does not have a significant effect on users' behavioral intention. Take the study by Chiou et al. (2009) as an example. They discovered that students' perceived ease of use and perceived usefulness significantly influence their attitude toward using personal digital assistant (PDA); however, their attitude toward using does not further influence their intention to use PDA for learning because they may have none or get no access to free wireless Internet service. In this case, students are reluctant to use PDA even if they have a positive attitude toward using it. Based on the aforementioned argument, students' attitude toward using Google Docs will not necessarily affect their continuance intention to use it when this option incurs additional fees. In this research, the subjects used Google Docs for free, which was why their attitude toward using had a significant effect on their continuance intention to use this service.

Table 6 presents the second finding of this research; that is, the influence of social presence on attitude toward using is more significant than those of other factors, especially with regard to its direct effect. This result implies that social presence played a particularly vital role in affecting the students' attitude toward Google Docs. A plausible explanation for this outcome is that the students could immediately check the actions taken by other team members when they were writing the script collaboratively. They could see the addition, deletion, and revision of words, tables, and pictures done by their team members online. In the meantime, they could communicate with one another about the revision of the script through the function of instant messaging provided by Google Docs. In other words, students realized that they were collaborating with real people (rather than virtual figures) in writing the script on Google Docs, which is an experience that traditional tools such as Microsoft Word cannot offer. The students could undergo such a novel experience only by using cloud services such as Google Docs. The students not only had a positive attitude toward Google Docs but also intended to use it continuously as a result. Similar findings can be seen in Cheung, Chiu, and Lee (2011) as well as Park and Lee (2010). They confirmed that social presence has a significant influence on users' intention to use social networking services. Specifically speaking, social presence refers to the psychological experience in which users can detect each other's existence, and the degree of social presence varies with the communication media. In other words, the more capable the medium is to communicate messages, the greater immersive experience the users have, and the higher degree their social presence is. Social networking services provide users with an interaction platform. Social presence is therefore a critical factor behind users' continuance intention to

Table 4
The discriminant validity of the measurement model.

Construct	Discriminant validity					
	Latent variable correlations					
	Perceived ease of use	Perceived usefulness	Social influence	Social presence	Attitude toward using	Continuance intention
Perceived ease of use	0.94					
Perceived usefulness	0.78	0.91				
Social influence	0.55	0.66	0.91			
Social presence	0.47	0.58	0.70	0.87		
Attitude toward using	0.70	0.76	0.72	0.76	0.92	
Continuance intention	0.65	0.70	0.61	0.63	0.86	0.88

Table 5
The cross-loadings of the measurement model.

	Perceived ease of use	Perceived usefulness	Social influence	Social presence	Attitude toward using	Continuance intention
(PEU1)	0.93	0.72	0.49	0.44	0.65	0.57
(PEU2)	0.96	0.75	0.52	0.43	0.68	0.64
(PEU3)	0.94	0.74	0.55	0.45	0.66	0.63
(PU1)	0.67	0.90	0.60	0.48	0.67	0.60
(PU2)	0.76	0.93	0.59	0.55	0.70	0.65
(PU3)	0.70	0.90	0.62	0.54	0.71	0.65
(SI1)	0.52	0.55	0.92	0.60	0.64	0.60
(SI2)	0.48	0.65	0.90	0.65	0.64	0.51
(SI3)	0.51	0.60	0.91	0.65	0.68	0.57
(SP1)	0.47	0.50	0.55	0.88	0.67	0.59
(SP2)	0.46	0.57	0.60	0.89	0.69	0.55
(SP3)	0.30	0.43	0.66	0.83	0.62	0.51
(SA1)	0.56	0.62	0.73	0.74	0.88	0.78
(SA2)	0.67	0.73	0.62	0.68	0.94	0.79
	0.69	0.75	0.63	0.68	0.93	0.80
(CI1)	0.68	0.70	0.58	0.64	0.86	0.92
(CI2)	0.44	0.52	0.50	0.46	0.64	0.84

Bold values signify that each item loading is greater than its cross-loadings on all other constructs.

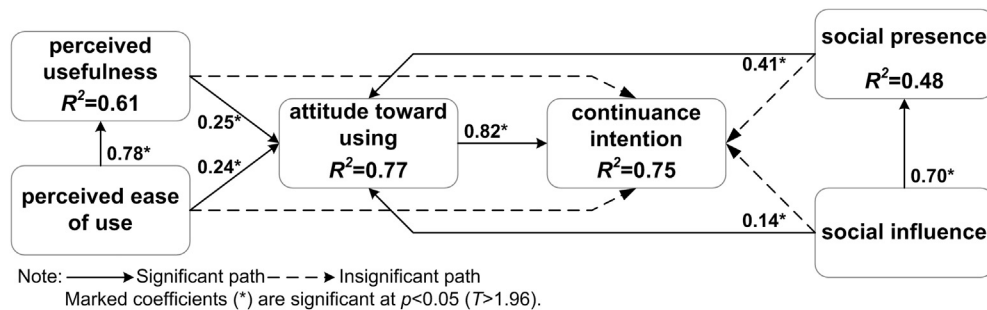


Fig. 2. The results of the structural model.

Table 6
The direct, indirect and total effects on continuance intention and attitude toward using.

Dependent variable	Independent variables	Direct effects	Indirect effects	Total effects
continuance intention	perceived ease of use	non-significant	0.36	0.36
	perceived usefulness	non-significant	0.21	0.21
	social influence	non-significant	0.35	0.35
	social presence	non-significant	0.34	0.34
	attitude toward using		0.82	
attitude toward using	perceived ease of use	0.24	0.16	0.40
	perceived usefulness	0.25		0.25
	social influence	0.14	0.24	0.38
	social presence	0.41		0.41

use these services. In this research, Google Docs' functions such as synchronous editing and instant messaging allowed the students to easily engage in social interaction. Social presence thus played a crucial role in affecting the students' attitude toward Google Docs.

Table 6 also reports the third finding of this research; that is, the influence of perceived ease of use on attitude toward using is more significant than that of perceived usefulness. Such an outcome implies that the students' attitude toward Google Docs was influenced primarily by perceived ease of use rather than perceived usefulness. This finding contradicts those presented by previous research on technology acceptance that identified perceived usefulness as the main factor behind users' behavioral intention in organizational contexts (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). A plausible explanation for the outcome is that these students had no experience in using Google Docs. The subjects who took part in this research were all freshmen who were novices at producing animations and writing scripts. Accordingly, they tended to concern more about Google Docs' ease of use than its usefulness in helping them write the animation script. Once they become familiar with the writing of animation script, they will concern more about whether Google Docs is able to help them create a better animation script in a more effective way. Lin (2011) also demonstrated that, first, the less the users are experienced in e-learning, the more influential perceived ease of use is in shaping their attitude toward e-learning; and second, the more the users are experienced in e-learning, the more influential perceived usefulness is in shaping their attitude toward e-learning. Xie (2003) as well as Castañeda, Muñoz-Leiva, and Luque (2007) also showed that inexperienced users tend to care more about the ease of use of a particular technology, while experienced users concern more about its usefulness. In other words, when Google Docs is applied instead in an animation company, the experience employees in the company will emphasize more on the service's usefulness rather than on its ease of use, for the former brings greater efficiency in their work.

Table 6 further reveals the fourth finding of this research; that is, the influence of social factors on attitude toward using is more significant than that of technological factors. This means that the students' attitude toward using Google Docs was influenced primarily by social factors rather than technological ones. A plausible explanation may emerge from cognitive script theory (Abelson, 1976; Fischer, Kollar, Stegmann, & Wecker, 2013). Cognitive scripts refer to "individuals' schemas for the sequence of behaviors, actions, and events that occur in common social exchanges" (Stevens, 1998: 56), in which a script refer to "a coherent sequence of events expected by the individual, involving him as either a participant or an observer" (Abelson, 1976: 33). To put it simply, cognitive scripts are script-like formations based on an individual's organized experiences, to which he/she can refer in the future to acquire instructions for how to behave in similar situations. For example, when using an unfamiliar social networking service such as Twitter, an individual will refer to his/her experiences in using other social networking services, namely the script-like formations, to understand the service relatively new to him/her. In other words, the individual will feel satisfied with Twitter when the actual happenings conform to his/her expectations; otherwise the service will be unsatisfactory to the individual. Table 6 reveals that the students' cognitive scripts appeared more inclined to social functions such as synchronous collaboration than to technological ones such as document editing when using Google Docs. This implies that the students were willing to continue using Google Docs when the service satisfied their expectations of social functions. Of course, it does not mean that the students did not expect technological functions at all. However, traditional word processing software is as capable as Google Docs in terms of the expected technological functions. In addition to fulfilling technological functions, satisfying the students' expectations of social functions was therefore a necessary prerequisite for ensuring their continuance intention to use Google Docs.

7. Conclusions

This research developed a new research model to investigate the factors that affect students' continuance intention to use cloud services. In this research, social influence and social presence were treated as social factors, while perceived ease of use and perceived usefulness as technological factors. Attitude toward using played the mediating role between users' continuance intention and these social and technological factors. We not only adopted Google Docs to help the students collaboratively edit their animation scripts, but also conducted an empirical research on the factors that influenced the students' intention to continue using Google Docs. The research findings suggest that these social and technological factors influenced students' continuance intention via the mediation of attitude toward using, which means that the influences of these social and technological factors were indirect. In addition, social presence and perceived ease of use had direct influences on attitude toward using, and social presence was the most significant factor among these social and technological factors. The results demonstrate that social presence was the most significant factor behind the students' attitude toward using Google Docs, and perceived ease of use was more influential than perceived usefulness in shaping the students' attitude toward using the technology. In sum, this research provided a more comprehensive understanding about students' continuance intention to use cloud services.

The research findings of this research have two major implications. First, the influences of social factors on students' continuance intention are more significant than those of technological factors. It implies that teachers must show their students the social interaction functions of a certain cloud service (e.g. synchronous collaboration fulfilled by Google Docs) to encourage students to continue using it; otherwise students may turn to the software such as Microsoft Word to which they have accustomed. In addition, system developers should develop cloud services that perform social interaction functions in order to increase the use of the services. Second, the ease of use of cloud services is more important than their usefulness for inexperienced users. It means that teachers should take students' experience into consideration when they intend to

introduce a particular cloud service into their teaching. For example, teachers should introduce easy-to-use cloud services to inexperienced students and useful ones to experienced students, for the purpose of enhancing students' continuance intention to use these services.

Although the research findings contribute to the development and application of cloud services in the field of education, they do have some limitations. First, this research focused only on a single cloud service, namely Google Docs. It remains unclear whether the use of other cloud services will produce the same outcome. Second, the students used Google Docs mainly through computers in this research. Since the access devices of cloud services is no longer limited to computers but extended to other mobile devices, we should further examine the influences of mobile devices' characteristics (such as the screen size of mobile devices and the mobile Internet access speed) on students' continuance intention to use cloud services. Third, this research focused only on the freshmen in the same department without examining whether their backgrounds such as age, gender, and specialties may influence their continuance intention to use cloud services. Accordingly, there is a continuing need for a larger sample and additional consideration on students' backgrounds to strengthen and advance our arguments. Fourth, all the subjects in this research were from the same oriental cultural background. It implies that we did not take the cultural aspects, namely the differences between oriental and occidental cultures, into account. We will further investigate the influence of cultural difference on the technology acceptance or the continuance intention of using a specific technology. Finally, this research adopted Google Docs only to foster the students' collaboration in writing animation scripts and to explore their continuance intention to use the service. As a result, it may be difficult to generalize the results of this research in different educational scenarios. In other words, this research did not address the question as to whether Google Docs will generate similar results in technology acceptance or usage continuance when it is assigned with different educational tasks. To make up this deficiency, we plan to investigate the relationship between educational task and technology acceptance or usage continuance under the condition of using the same cloud service.

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