Exploring the Antecedents of Collaborative Learning Performance over Social Networking Sites in Ubiquitous Learning Context

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Abstract

With technological and internet development, digital learning has become a trend in ubiquitous learning (u-Learning). However, there have been few studies on the U-learning environment focusing on the effect of social network websites on success factors of collaborative learning activity. Focusing on the social network websites’ collaborative learning environment, understanding of learner acceptance and usage effects of social network websites’ collaborative learning environments will be key factors to the success or failure of development of social network websites’ collaborative learning environments. Thus, this study aims to explore the antecedents of collaborative learning performance over social networking sites in ubiquitous learning context by using an extended technology acceptance model (TAM) and external factors, including collective efficacy and personal innovativeness in information technology (PIIT). This study uses questionnaire survey, collecting 321 valid questionnaires, using partial least squares (PLS) method to test the research model. The research results will be given as feedback to school departments and instructional material production departments, in order to serve as a reference for promoting information education and future improvement of platform design.

Keyword: Social Network Websites, Collective Efficacy Theory, Technology Acceptance Model, Collaborative Learning, Learning Effectiveness
1. Introduction

In the U-learning environment, learners can learn at any time and place, and meanwhile, they can interact and communicate with teachers or peers; through digital learning, the source of knowledge is more diverse and fast, and can save educational costs, enhance learning quality, enhance learning efficiency, and in turn achieve lifelong learning (Pownell & Bailey, 2001). In recent years, Web 2.0 technology has introduced new models for websites, such as social network websites, which are quite popular. Currently, the lifestyles of young people have been deeply embedded in online communities, especially university students, who make up a great percentage of the total population of social network websites (Madge, Meek, Wellens, & Hooley, 2009). With the development of social network website platforms, student socializing has gradually grown to focus on online platforms, which inspire students to learn autonomously, and exchange knowledge as a channel for communication.

The learning model of “internet social learning” is a space outside of normal classroom activities where people can share, learn, and interact, without the restriction of time and location. Chang (2003) defines “internet learning communities” as: a group of experts and scholars are gathered in the internet community, learn and work together, and exchange opinions in an established virtual space. They fully utilize the virtual space formed using technology, in which the participants, instructors, and external scholars conduct joint learning and research on a certain topic, breaking through the restrictions of time and space, jointly share knowledge and exchange opinions, elevating the knowledge and abilities of the whole community. Internet learning communities do not have the power to limit learners. Thus, at any time, students can learn and interact with peers on the social network website platforms, and teachers can give feedback at any time. Recent studies show that in internet learning, students have considerable self-regulating ability, and receive feedback from interaction with others, and elevating their learning effectiveness (Wang & Wu, 2008). In addition, the issue of incorporating social network websites into various levels of education has become a direction that many scholars seek to explore. Thus, exploration of the role and advantages of social network websites in instruction and further planning of social network websites as learning environments is an issue that deserves attention.

In recent years, many studies have emphasized the importance of collaborative learning, and collaborative learning has been proven to be an effective instruction method (Cohen, 1994; Isman & Celikli, 2009; Moon et al., 2011; Vygotsky, 2007), because it can promote development of self-efficacy, enhance learning motivation, active learning attitude (Johnson et al., 1998), help students enhance learning effects, learning motivation, and social techniques (Johnson & Johnson, 1989; Huang et al., 2011). However, few studies
have explored collaborative learning in the environment of U-learning. Thus, this study hopes to introduce collaborative learning strategies into U-learning environments, and use team cooperation to enhance peer interaction, to effectively enhance student learning achievements and learning motivation.

In addition, in the collaborative learning environment of social network websites, collaborative learning is used to integrate member work into a group to complete collective objectives. Thus, how to inspire effective group cooperative behavior is an issue worthy of attention. In literature relating to collaborative learning, social cognitive theory (SCT) is an important theory used to explain cooperative relationships. Many studies have constructed social cognitive theory to explain relationships in personal perception, such as: self-efficacy and expectation of results, computer usage, and internet behaviors (e.g., Compeau & Higgins, 1995b; Hsu & Lu, 2004; Thompson, Meriac, & Cope, 2002). However, these studies have overlooked the importance of social networks; important research in social cognitive theory should include a group’s collective efficacy and group performance. Based on this, social cognitive theory expands the concept of human motivation to collective agency, expanding the concept of self-efficacy to the collective level (Bandura, 1986, 1997). Many past studies have shown that collective efficacy can effectively explain group behavior, group cooperation, and group performance (Baker, 2001; Bandura, 1997; 2000), and that collective efficacy has a key influence on group cooperation and group performance (Wang & Lin, 2007; Kim & Park, 2012). However, currently there are very few studies that use the angle of collective efficacy to explore learner acceptance for social network websites’ collaborative learning environment and usage effect. Thus, this study will use collective efficacy as the first personal difference variable of learners in the social network websites’ collaborative learning environment. It is expected if there is effective elevation of group or organizational collective efficacy, it would benefit group accomplishment, and achieve group objectives.

In order to effectively promote the application of social network websites’ collaborative learning platform in U-learning environments, the acceptance by learners of learning technology in this environment would be an important factor. Research in the past few years shows that technology acceptance model (TAM) has been proven to be an important explanatory model in personal acceptance or usage of new information technology. TAM emphasizes the influence of perceived conditions on usage intentions and behaviors, but did not make many definitions of external environmental considerations (Dishaw & Strong, 1999), previous studies also support that personal differences can affect the behavioral intentions for using IT through personal beliefs in using information technology (Wang & Wang, 2008; Wang et al., 2011).
Among personal difference variables, the acceptance of new information technology has often been explored in the adoption of new technologies. Agarwal et al. (2000) proposes that if individuals have higher personal innovativeness in information technology (PITT), then they are more confident in their abilities in using new information technology. In the social network websites’ collaborative learning context, as learners face the new learning context, the extent to which learners are willing to try any information technology (PITT) would influence their beliefs, attitudes, and usage effect about this information technology (Agarwal & Prasad, 1998). Thus, this study uses personal innovativeness in information technology (PITT) as the second personal differences variable. Based on the above explanations, this study primarily explores the behavioral models of learners using social network websites to engage in collaborative learning in the U-learning learning environment, extending Moon & Kim (2001) technology acceptance model (TAM) framework, and collective efficacy theoretical perspective (Bandura, 1997), adding two personal differences variables, including the two variables of collective efficacy and personal innovativeness in information technology (PITT), to explore the learner acceptance for the social network websites’ collaborative learning and usage effects in the U-learning environment. It is hoped to establish an evaluation model for the successful promotion of social network websites’ collaborative learning platform, provided to digital learning teachers, digital learning platform businesses, and academic research departments as a reference in planning and modifying platforms.

2. Theoretical background

This study explores the U-Learning environment, learner acceptance for social network websites’ collaborative learning platform and usage effect, in order to strengthen the basis of the research model, related literature and theoretical basis are used to construct the research model. These include the technology acceptance model, collective efficacy theory, and learning platform effect evaluation method, to construct an evaluation model for the acceptance and usage effects of social network websites’ collaborative learning platform.

2.1 Technology Acceptance Model (TAM)

Technology acceptance model was a behavioral belief model developed by Davis in 1989 based on theory of reasoned action (TRA), and asserts that perceived usefulness and ease of use would affect attitude toward using, in turn affecting concrete behavioral performance (David, 1989). In the technology acceptance model (TAM) structure, there are 5 main dimensions, which are perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and system usage. Davis (1989) suggested that
user perceptions and beliefs would affect their attitude toward use and behavioral intention to use, further influencing user system usage.

In recent years, TAM has gradually been applied to studies on digital learning. Raaij and Schepers (2008) applied TAM in the virtual digital learning environment, and the results proved that perceived usefulness has a significant effect on system usage, while perceived ease of use indirectly affects system usage through perceived usefulness. Even applied to e-learning system verification in general workplaces, TAM can similarly predict user behavioral intention to use e-learning (Liaw, 2007; Ong et al., 2004), especially Liaw (2007) proved that perceptions have a major effect on behavioral intentions.

Perceived playfulness has been widely adopted in recent studies about technology usage behavior (Morosan and Jeong, 2008; Koo, 2008; Roca and Gagne, 2008). Focusing on the information technology usage model, perceived playfulness is defined to have three dimensions (Deci and Ryan, 1985; Moon and Kim, 2001): concentration, curiosity, and enjoyment. Technology acceptance of the internet is proposed, to design a perceived playfulness scale for consumers online, as shown in Figure 1.

![Figure 1. The Extended Technology Acceptance Model (Moon & Kim 2001)](image)

### 2.2. Collective Efficacy Theory

Social cognitive theory expands the concept of human motivation to collective agency, expanding the concept of self-efficacy to the collective level, naming it collective efficacy (Bandura, 1986, 1997). Collective efficacy refers to member determinations of group ability when groups face specific tasks. Meanwhile, it has a key influence on group cooperation and performance (Baker, 2001; Bandura, 1997; 2000), thus if it can effectively enhance organizational or group collective efficacy, it would help with group accomplishment.
2.3. The Relationship between Collaborative Learning and Collective Efficacy

Collaborative learning developed from the work of psychologists (Johnson and Johnson, 1975; Slavin, 1987), and is a process in which students form teams to complete tasks together, and promote learning through interpersonal exchange (Alavi et al., 1995). Thus, the concept of collaborative learning acts through the three premises of problem-solving: active learning, knowledge construction, team cooperation and learning, as well as problem-solving learning (Alavi et al., 1995), to achieve effective learning. In addition, information technology is more complex, so that learners are focusing on interactive cooperation and teams, while education researchers and teachers focus on students, to conduct instructional activities in social and collaborative methods (Yang & Liu, 2003; Hsu et al., 2007).

According to social cognitive theory (Silver & Bufanio, 1996), the objectives sought by groups are ones that they believe they can realize and they avoid ones that may be too difficult. Collective efficacy is an extension of self-efficacy, including group performance (Bandura, 1986, 1997). In collaborative learning environment, collective efficacy plays the important role of enhancing individual self-efficacy of learners, elevating group ability and improving past group performance (Bandura, 1986, 1997, 2000; Gibson et al., 2000). Many studies show that the motivation of self-efficacy can play a positive role in the learners’ continuation of their learning behavior (Lent et al., 2006), this can be effective applied to Computer Supported Collaborative Learning (CSCL) for learner behavior (Computer Supported Collaborative Learning, CSCL) (Wang & Lin, 2007). In addition, some studies have verified that application of collective efficacy on collaborative learning can enhance the learning intentions and effects of learners (Moon et al., 2012; Wang & Hwang, 2012).

2.4 The usage effect of the social network websites’ collaborative learning platform

From the educational perspective, a good learning model needs evaluation mechanisms to facilitate the bilateral learning activities between instructors and learners to, and learning effects are the indicators measuring learning accomplishments. In the e-learning environment, evaluation of learning effectiveness differs from in traditional face-to-face instructional environments. Other than actual learning effectiveness in learning content as measurement standards, Bostrom et al. (1990) suggested that, learner attitudes toward internet learning is also very important. Chiu et al. (2007) indicated that successful e-learning is determined by learner satisfaction and influences their continued usage.
In sum, TAM stresses the effect of perceptions on usage intention and behavior. Some scholars believe that TAM has shortcomings, such as lack of clarity on external environmental factors and insufficient definition (Dishaw & Strong, 1999). Previous studies support that personal differences can significantly influence IT usage behavioral intentions through personal beliefs about using IT (Hong et al., 2002; Wang & Wang, 2008; Wang et al., 2011). Thus, this study extends the framework by Moon & Kim (2001), which expects that personal differences has an indirect influence on behavioral intentions and a direct influence on personal perception of believes, emphasizing the influential factors of perceived playfulness, adding two external factor dimensions of collective efficacy theory and personal innovativeness in information technology, to explore learner acceptance of social network websites’ collaborative learning environment and usage effect.

3. Research Model and Hypotheses

This study seeks to explore learner acceptance and effects of social network websites’ collaborative learning platform in the U-learning environment. Other than using a theoretical basis relating to the technology acceptance model, related educational theory will be used to measure user learning attitude and learning effectiveness. This study is based on Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), modifies the research by Davis et al. (1989), and extends the technology acceptance model (TAM) proposed by Moon & Kim (2001), adding perceived playfulness as the independent variables in order to explore the effect of perceived playfulness and learning motivation, attitude, and usage effect. In addition, in order to understand other variables for learners in usage behavior in social network websites’ collaborative learning environment, and consider the field of information and education technology acceptance, personal innovativeness in information technology (PITT) and self-efficacy are commonly studied individual difference variables (e.g., Agarwal & Prasad, 1998; Featherman et al., 2006; Bandura, 2000; 2001a). The research model adds exploration of external factors, including the effect of personal innovativeness in information technology (PITT) and collective efficacy (Bandura, 1986, 1997) on attitudes and usage effects of social network websites’ collaborative learning, as shown in Figure 2.
3.1. Perceived Usefulness

Bhattacherjee (2001a) defined perceived usefulness as “user feelings about the benefits of system usage,” Davis (1989) defined perceived usefulness as “users have subjectively prospective ideas about the possible increase of work performance in the organization after using a certain application system.” This study extends the definitions by Davis (1989) and Bhattacherjee (2001a), defining perceived usefulness as “users have subjectively prospective idea that the usage of social network websites’ collaborative learning platform may increase learner learning attitude and usage effect.”

3.2. Perceived Ease of Use

In the technology acceptance model, Davis (1989) defined perceived ease of use as: users believe that using new information technology can enhance their degree of being free of effort, or that user’s perception of ease of use of new technology, and perceived ease of use would directly affect the perceived usefulness and usage intention of new technology for users. This study extends the definition by Davis (1989) & Bhattacherjee (2001a), to define perceived ease of use as “the extent to which the individual believes that it is easy to use social network websites’ collaborative learning platform.”
3.3. Perceived Playfulness

Past studies have proposed that the usage of information technology is affected by dimensions relating to perceived playfulness (Davis et al., 1992; Igbaria et al., 1994; Agarwal and Karahanna, 2000; Van der Heijden, 2004). The intention of users to use information platforms is affected by whether they feel stressed or playful when using the platform (Igbaria et al., 1996; Sun and Zhang, 2004). This study defines perceived playfulness as “learner usage of social network websites’ collaborative learning platform, concentration, curiosity, and enjoyment.” According to flow theory (Csikszentmihalyi, 1975), the study by Webster et al.’s (1993) shows that perceived playfulness has a strong correlation to user expectations of voluntary usage. Thus, we propose that the individual interest in the attraction and interactive process for using social network websites’ collaborative learning platform is an important effect on their beliefs and attitudes to this learning environment.

3.4. Personal Innovativeness in Information Technology (PIIT)

Personal innovativeness in information technology is defined as the extent to which an individual is willing to try any new information technology (Agarwal & Prasad, 1998). Personal innovativeness in information technology is conceptualized as the extent to which an individual is willing to accept and try using any new technology (Agarwal & Karahanna, 2000). It is necessary to explore this characteristic in new technology; users with higher personal innovativeness in information technology also have greater confidence and acceptance for new technology. According to the definition by Agarwal & Prasad (1998), we propose that acceptance for information technology (PIIT) would influence user perceived playfulness and perceived ease of use toward social network websites’ collaborative learning environment.

3.5. Collective Efficacy

Collective efficacy refers to group member determinations about the abilities of their group, or the group’s shared beliefs about whether the group can successfully complete certain objectives (Bandura, 1986, 1997, 2000). Collective efficacy can be summed up by individual abilities and beliefs for carrying out tasks or abilities and beliefs of group members for carrying out tasks (Goddard, 2001), and can also be evaluated by joint discussion and evaluation among group members to create consistent consensus among members about collective efficacy (Gibson et al., 2000). In this study, collaborative tasks need a high degree of interdependent work, and all students need to contribute their hard work to realize the objective. Researchers also mentioned that collective efficacy has a major influence on cooperative performance (Bandura, 1997; Goddard, 2001; Peterson,
Mitchell, Thompson, & Burr, 2000). Agarwal & Karahanna (2000) proposed that self-efficacy would positively influence perceived usefulness and perceived ease of use. Moreover, self-efficacy is the result of student cognition achieving expectations, and is an important variable for predicting learning achievements and other motivation beliefs (Lent et al., 2006; Printrich & Schunk, 2002; Wang & Lin, 2007). Thus, this study’s hypotheses are based on the collective efficacy hypotheses proposed by Bandura (1986, 1997, 2000), Wang & Lin (2007), and Agarwal & Karahanna (2000) as the developmental basis, proposing that collective efficacy would influence learner perceived playfulness, perceived ease of use, and perceived usefulness in the social network websites’ collaborative learning environment.

3.6. Learning attitude

Simonson et al. (2000) suggested that attitudes, experiences, cognition, and forms of learning are four important indicators that can enhance the learner’s digital learning process, and attitudes are the most important indicators. Since attitude has an orientation function for perceived activity and the flight response, attitude can influence learning; learning attitude implicates behavioral inclinations expressed when learning things, such as learning activity participation, learning process performance, and strength of learning intentions. In sum of the above, this study considers the characteristics of the digital learning environment, which will use learner attitude toward use, participation intention, and degree of preference for the system as the measurement indicators of learning attitude.

3.7. Usage effectiveness

This study not only explores learner attitudes toward social network websites’ collaborative learning environment, but also extends usage effects after usage, including learning satisfaction, learning effectiveness, self-perceived usage effects, and intention of continued usage.

3.7.1. Learning Satisfaction

Most researchers believe that satisfaction are experiences and feelings of users after system usage (Mckinney et al., 2002; Bhattacherjee, 2001a; 2001b; Spreng et al., 1996), and there are also scholars who believe satisfaction should be defined as the extent to which the users believes the information system conforms to their needs, user satisfaction is determined by user perception, rather than the technical quality of the system (Ives et al., 1983). The research subjects of this study are users of social network websites’ collaborative learning platform, so this study uses Ives et al. (1983) to redefine
satisfaction as: the extent to which learners believe that the social network websites’ collaborative learning platform they use can provide them with information that they need, and this is used to measure learner perceptions about system services.

3.7.2. Learning Effectiveness

Social constructivism scholars believe that knowledge is constructed when an individual discusses and coordinates with others. Thus, the quality of the interactive model would determine student learning effects, so this study will explore whether the learner’s interaction with the group, personal innovativeness in information technology, and acceptance in social network websites’ collaborative learning platform have a significant effect on learning effectiveness.

3.7.3. Self-perceived Usage Effects

In exploring past literature about self-perceived usage effects, the one more similar to self-perceived usage effects is post-usage evaluation. The content of post-usage evaluation includes the three parts of usage background, manifest behavior, and psychological response, which also include items of user demand, cognition, pleasure, and whether the needed information is beneficial (Snyder, 1979). Taking the same view, self-perceived usage effects is redefined as: “learner post-usage evaluation of social network websites’ collaborative learning platform.” If learner usage of social network websites’ collaborative learning platform has high perceived ease of use, usefulness, and playfulness, then there would be better learning attitude, as well as better self-perceived usage effects.

3.7.4. Continuance Usage Intention

Bhattacherjee (2001a; 2001b) defines intention of continued usage as: “the intention of users to continue to use the system,” extending this concept to social network websites’ collaborative learning platform, using the same perspective to redefine the intention of continued usage as: “learner intention to continue using the social network websites’ collaborative learning platform.” The measurement of intention of continued usage refers to Davis (1989) and Zeithaml and Berry (1996), which is modified into a scale that is suited to measuring learner intention of continued usage.

Based on the above literature, the research hypotheses are described as follows:

H1: Perceived Ease of Use will have a positive effect on Perceived Playfulness in the social network websites’ collaborative learning platform.

H2: Perceived Ease of Use will have a positive effect on Perceived Usefulness in the
social network websites’ collaborative learning platform.

H3: Perceived Ease of Use will have a positive effect on Learners’ Attitude in the social network websites’ collaborative learning platform.

H4: Perceived Usefulness will have a positive effect on Learners’ Attitude in the social network websites’ collaborative learning platform.

H5: Perceived Playfulness will have a positive effect on Learners’ Attitude in the social network websites’ collaborative learning platform.

H6: Personal innovativeness in information technology will have a positive effect on Perceived Playfulness in the social network websites’ collaborative learning platform.

H7: Personal innovativeness in information technology will have a positive effect on Perceived Ease of Use in the social network websites’ collaborative learning platform.

H8: Collective efficacy will have a positive effect on Perceived Playfulness in the social network websites’ collaborative learning platform.

H9: Collective efficacy will have a positive effect on Perceived Ease of Use in the social network websites’ collaborative learning platform.

H10: Collective efficacy will have a positive effect on Perceived Usefulness in the social network websites’ collaborative learning platform.

H11: Learners’ Attitude will have a positive effect on Learning Satisfaction in the social network websites’ collaborative learning platform.

H12: Learners’ Attitude will have a positive effect on Learning Effectiveness in the social network websites’ collaborative learning platform.

H13: Learning Attitude will have a positive effect on self-perceived usage effects in the social network websites’ collaborative learning platform.

H14: Learners’ Attitude will have a positive effect on Continuance Usage Intention in the social network websites’ collaborative learning platform.

4. Description of Experiment Design

4.1 Measures

This study uses questionnaire survey for sample collection. The questionnaire design process first involves collecting literature relating to dimensions in the framework of this study. Two MIS professors and two doctoral students carry out discussion to modify the question items, and a pilot study is used to develop the official questionnaire. Thus, the questionnaire in this study has considerable content validity. This study divides the questionnaire into two portions. The first part is personal data, including gender, age, education, and occupation. The second part is investigates the learner acceptance for social network websites’ collaborative learning platform, this part tests for subjects’
personal innovativeness in information technology and collective self-efficacy on perceived playfulness, usefulness, and ease of use; the influence of perceived playfulness, perceived ease of use, and perceived usefulness on learning attitude; and the relationships of learning attitude on satisfaction, learning effectiveness, self-perceived usage effects, and intention of continued usage.

The selected measurement items must be normalized to the learning environment of social network websites, and the content validity must be verified. Thus, in order to verify content validity, the measurement items of this study primarily come from previous studies. Among them, personal innovativeness in information technology adopts Agarwal et al. (1998) & Agarwal & Karahanna (2000). perceived ease of use adopts the measurement by Davis (1989) & Davis et al. (1989); perceived usefulness adopts Van der Heijden (2003); perceived playfulness adopts the measurement by Webster & Martocchio (1992) & Moon and Kim (2001); learning attitude adopts the measurement by Johnson et al. (1991), Pintrich et al. (1991) & Simonson et al. (2000); collective efficacy adopts the measurement by Bandura (1986, 1997); satisfaction and self-perceived usage effects refer to the scale proposed by Gagne et al.(1992), intention of continued usage refers to the scale by Van der Heijden (2003); and learning effectiveness refer to the scale proposed by Roca & Maryl`ene Gagn´e (2008). The questionnaire uses the Likert 7-point scale for measurement, from “highly disagree” to “highly agree,” which are measured with points 1-7. Questionnaire survey items have some expert modification to be suitable to the social network websites’ collaborative learning environment.

4.2 Participant

Between October and December 2011, this study released questionnaires to students who have used social network websites’ collaborative learning platform, retrieving 384 questionnaires. After discarding 63 invalid questionnaires, there were 321 valid questionnaires, with a valid return rate of 83%. This study performed descriptive statistical analysis for personal basic data, including: 1) gender; 2) Age; 3) education, and 4) occupation, the sample frequency distribution and percentages are shown in Table 1.

A sample of 321 valid responses was obtained from a variety of respondents with different demographic background. In terms of the respondents, 61% were male and 39% were female. Approximately, 92% of the respondents were aged 20-29 and 89% of the respondents had over six years of computer experience. Also, 96% of the respondents had attained a degree at the collegiate level or above. All of the respondents had online learning experiences.
4.3 Introduction about the Collaborative Learning content of social network websites

This study evaluated learner acceptance and usage effect in social network websites’ collaborative learning platform in the U-learning environment. Since the jigsaw-based collaborative learning methods would give tasks to all members of the team, it would not only increase student interaction, but can also arrange for all students to participate in learning activities, which can enhance student collaborative learning effectiveness. Thus, this learning activity uses jigsaw-based collaborative learning method (Aronson & Patnoe, 1997), to enhance student attitudes and effects in collaborative learning.

Even though jigsaw-based collaborative learning can enhance student collaborative learning effectiveness, considering that the learning environment of this study is outdoors, and that learning team members may be dispersed in different places for learning and research, they are unable to carry out real-time communication and discussion, lowering the effect of jigsaw-based learning. In order to overcome this problem, we use Google Plus as a learning platform that can effectively connect in-group cooperation and discussion, which can provide real-time assistance so that students and teachers can learn under a complex backdrop, and can use immediate communication and collaborative discussion to grasp the learning conditions for each learner. Many studies have explored the uses of Google Plus in education, and there are studies that have stated that learners can use internet social learning to construct knowledge, gain meaningful learning experiences, and enhance their own thinking ability (Garrison & Kanuka, 2004), which can also improve students’ collaborative learning, using social circles and teacher-student interaction to assist students organize knowledge and learning experiences (Erkollar and Oberer, 2011).

This study uses university general education course “Taiwan Ecological Culture – Waters.” The purpose of the learning activity is to guide student understanding of the ecological environment of waters in Taiwan. Students observe the fishes and ecological environment in the upstream, midstream, and downstream of rivers as seen at the National Museum of Marine Biology and Aquarium. It is expected that this experiment can help students fully understand the differences between different ecological environments in the waters of Taiwan as well as relationships among the learning objectives. Furthermore, in order to let students understand the real ecological environment and fish distribution, the learning environment is the National Museum of Marine Biology and Aquarium in southern Taiwan. The main purpose is to let students understand the distribution of waters in Taiwan and unique ecology in Taiwan by combining the classroom explanations by teachers with the real objects.
In this experiment, 384 university students from the information management major at a university in southern Taiwan voluntarily participated in the jigsaw-based team cooperation method. Heterogeneous groups are used with three students to each group, for a total of 128 groups. Figure 3 shows the experiment flow. In the learning process, students use Google Plus, which provides for location-based services, photography, videos, and hyperlink functions, as well as photo editing functions, allowing for direct annotation on the images. In addition, there are team videoconferencing meetings, which can allow team members to discuss even when they are in different areas. There is also instant messaging, so when team members have questions, they can use this function to communicate with other members or teachers. The Google Plus learning platform is used for jigsaw-based team cooperation to discuss questions on the platform. On the platform, there are 3 questions, and each student is responsible for one. Students responsible for the same question in each team form expert teams, who discuss the content of the question and make responses on the platform. After 40 minutes of discussion, they return to the original team to share about their question. Then, 40 minutes are given so that they can exchange knowledge. Finally, the teacher sets one more question for team cooperation and discussion, so that team members can cooperatively discuss and respond to related questions. In the experiment, the teacher will be nearby to monitor student learning, in order to have a grasp of the learning situation of students. Figure 4 is the screen of the Google Plus learning platform.
Figure 4. Social Networking Google Plus learning platform screen

Figure 5. Experimental architecture
Other than formal learning activities, students and teachers can use Google plus to carry out interaction and discussion after class, and teachers can use Google plus to understand student learning, providing timely feedback. The framework for formal and after-class learning activities are shown in Figure 5.

5. Data analysis and results

This chapter will analyze and discuss the survey sample data, divided into demographic variables of the subjects, reliability and validity analysis of the research tools, and tests for the research models and hypotheses.

5.1. Reliability of the instrument

Reliability refers to the consistency or stability of measurement results or the consistency of results among researcher’s different measurements (for different forms or different times) for same or similar phenomenon (or groups). Nunnally (1978) suggested that Cronbach’s α coefficient must be over 0.7 to be in a higher range for acceptance. Based on results of this study, it can be seen that the Cronbach’s α coefficients of 10 dimensions are between 0.829 and 0.952, which conform to the scholarly standard of Cronbach’s α coefficients being higher than 0.7. SPSS 15.0 is used to perform reliability analysis for various dimensions of this study, and the results are shown in Table 1.

5.2. Validity of the instrument

5.2.1 Convergent Validity

The test for convergent validity includes average variance extracted (AVE) and composite reliability (CR), with the analytical results as shown in Table 1. Fornell & Larcker (1981) suggested that average variance extracted (AVE value) should be over 0.5. The average variance extracted (AVE value) of the dimensions are between 0.667 and 0.840, which conform to the standard value of being greater than 0.5. Composite reliability (CR value) is formed by the reliability of all measurement variables in a certain dimension, and represents the internal consistency of the construct indicators. Fornell & Larcker (1981) suggested that the composite reliability (CR value) should be above 0.6, and Taylor & Todd (1995) pointed out that the value must be over 0.6, which shows that the questions in each dimension are measuring the dimensions to which they belong. If reliability is high, it means that there is high internal consistency of these indicators, and that the composite reliability (CR value) of the dimensions is between 0.89 and 0.96, and also reach the standard value of being greater than 0.6. The results of the tested conditions show that the questionnaire survey tool used in this study has convergent validity.
Table 1. Convergent validity

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>Composite Reliability (CR)</th>
<th>Average Variance Extracted (AVE)</th>
<th>$\sqrt{AVE}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective self-efficacy (CSE)</td>
<td>0.90</td>
<td>0.93</td>
<td>0.68</td>
<td>0.82</td>
</tr>
<tr>
<td>Personal innovativeness in information technology (PITT)</td>
<td>0.83</td>
<td>0.89</td>
<td>0.67</td>
<td>0.82</td>
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<td>Perceived playfulness (PP)</td>
<td>0.93</td>
<td>0.94</td>
<td>0.73</td>
<td>0.85</td>
</tr>
<tr>
<td>Perceived ease of use (PE)</td>
<td>0.92</td>
<td>0.94</td>
<td>0.80</td>
<td>0.89</td>
</tr>
<tr>
<td>Perceived usefulness (PU)</td>
<td>0.88</td>
<td>0.92</td>
<td>0.80</td>
<td>0.90</td>
</tr>
<tr>
<td>Learning attitude (LT)</td>
<td>0.93</td>
<td>0.94</td>
<td>0.63</td>
<td>0.80</td>
</tr>
<tr>
<td>Learning satisfaction (LS)</td>
<td>0.94</td>
<td>0.95</td>
<td>0.74</td>
<td>0.86</td>
</tr>
<tr>
<td>Self-perceived usage effects (UE)</td>
<td>0.94</td>
<td>0.95</td>
<td>0.74</td>
<td>0.86</td>
</tr>
<tr>
<td>Continued usage intention (CI)</td>
<td>0.95</td>
<td>0.96</td>
<td>0.83</td>
<td>0.91</td>
</tr>
<tr>
<td>Learning effectiveness (LE)</td>
<td>0.95</td>
<td>0.96</td>
<td>0.84</td>
<td>0.92</td>
</tr>
</tbody>
</table>

5.2.2 Discriminant Validity

Discriminant validity refers to the difference between one dimension and other dimensions in terms of characteristics in the theoretical system. Tests for discriminant validity include the square roots of average variance extracted and the correlation coefficients with other dimensions. In Table 2, the square root of the AVE value is shown with bold letters on the diagonal line. The number in each grid below represents the correlation coefficient between each dimension. After comparing the square roots of AVE values and correlation coefficients of each dimension, it is known that the square roots of the AVE values of each dimension are greater than the correlation coefficient values of dimensions, which means that the dimensions of this study conform to the requirements of discriminant validity.
Table 2. Convergent validity and Discriminant validity

<table>
<thead>
<tr>
<th></th>
<th>CSE</th>
<th>PITT</th>
<th>PP</th>
<th>PE</th>
<th>PU</th>
<th>LT</th>
<th>LS</th>
<th>UE</th>
<th>CI</th>
<th>LE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PITT</td>
<td>0.632</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP</td>
<td>0.676</td>
<td>0.550</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.704</td>
<td>0.678</td>
<td>0.613</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.720</td>
<td>0.619</td>
<td>0.690</td>
<td>0.807</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT</td>
<td>0.678</td>
<td>0.651</td>
<td>0.689</td>
<td>0.620</td>
<td>0.693</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LS</td>
<td>0.707</td>
<td>0.566</td>
<td>0.752</td>
<td>0.690</td>
<td>0.739</td>
<td>0.707</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>UE</td>
<td>0.749</td>
<td>0.559</td>
<td>0.694</td>
<td>0.677</td>
<td>0.743</td>
<td>0.698</td>
<td>0.825</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>CI</td>
<td>0.637</td>
<td>0.492</td>
<td>0.654</td>
<td>0.613</td>
<td>0.671</td>
<td>0.598</td>
<td>0.710</td>
<td>0.789</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td>0.638</td>
<td>0.499</td>
<td>0.615</td>
<td>0.593</td>
<td>0.678</td>
<td>0.600</td>
<td>0.677</td>
<td>0.786</td>
<td>0.576</td>
<td>0.916</td>
</tr>
</tbody>
</table>

1. CSE: Collective self-efficacy; PITT: Personal innovativeness in information technology; PP: Perceived playfulness; PE: Perceived ease of use; PU: Perceived usefulness; LT: Learning attitude; LS: Learning satisfaction; LE: Learning effectiveness; UE: Self-perceived usage effects; CI: Continued usage intention
2. Diagonal elements are the square roots of average variance extracted; off-diagonal elements are the correlation coefficients.

5.3. Hypotheses testing

SmartPLS 2.0 is used to test the research model. Since PLS does not provide for fitness of the overall model, but uses explanatory power (R^2) to test for the predictive ability of the structural path. This study uses bootstrapping in parameter estimation, which is a nonparametric method, and carries out re-sampling of sample data to estimate statistical distribution. According to the suggestion by Chin (1998) the instances of sampling is set to 500, to serve as the basis for significance testing of the estimation values for each structural path. Figure 4 shows that, the variance explanatory power of perceived playfulness is 0.50, which means that perceived ease of use (b = 0.222, p<0.001), personal innovativeness in information technology (b = 0.113, p<0.001), and collective efficacy (b = 0.447, p<0.001) have an explanatory power of 50% for perceived playfulness, thus, H1, H6 and H8 are supported. The variance explanatory power of perceived ease of use is 0.586, which means personal innovativeness in information technology (b = 0.383, p<0.001) and collective efficacy (b = 0.463, p<0.001) has an explanatory power of 58.6% for perceived playfulness, thus, H7 and H9 are supported. The variance explanatory power of perceived usefulness is 0.698, which means that perceived ease of use (b = 0.395, p<0.001) and collective efficacy (b = 0.301, p<0.001) have a 58.6% explanatory power for perceived playfulness, thus, H2 and H10 are supported.
The variance explanatory power of learning attitude is 0.57, which means that perceived playfulness (b =0.392, p<0.001), perceived ease of use (b =0.111, p>0.05), and perceived usefulness (b =0.333, p<0.001) have an explanatory power of 56.9% for learning attitude, thus, H4 and H5 are supported. The variance explanatory power of satisfaction is 0.36, which means that learning attitude (b =0.600, p<0.001) has an explanatory power of 36% for satisfaction. The variance explanatory power of learning effects is 0.50, which means learning attitude (b =0.707, p<0.001) has an explanatory power of 50% for learning effects. The variance explanatory power of self-perceived usage effects is 0.487, which means learning attitude (b =0.698, p<0.001) has an explanatory power of 48.7% for self-perceived usage effects. The variance explanatory power of intention of continued usage is 0.358, which means that learning attitude (b =0.598, p<0.001) has an explanatory power of 35.8% for intention of continued usage. Thus, H11, H12, H13 and H14 are supported. In the research model, H1 to H14, other than H3 which was not established, all the other hypotheses are supported.

6. Discussion and Implication

This study modifies Davis et al. (1989) and extends the technology acceptance model by Moon & Kim (2001), adding exploration of external factors including: personal innovativeness in information technology and collective efficacy to explore learner attitudes and usage effects of social network websites’ collaborative learning platform, as shown in Figure 2. Research results show that if learners have higher personal
innovativeness in information technology, they would also have higher perceived playfulness and ease of use in “social network websites’ collaborative learning platform.” It can be deduced that if learners can better accept new information technology, then they would have higher playfulness and ease of use for using social network websites to conduct collaborative learning, in turn elevating learning attitude and usage effect.

Since collective efficacy positively influences perceived playfulness, perceived ease of use, and perceived usefulness, it can be deduced that learners have greater perception of team member ability in using “social network websites’ collaborative learning platform” for collaborative learning and successful completion of learning activities, then learners also have greater perceived playfulness, ease of use, and usefulness. In addition, learners have higher perceived playfulness and usefulness and can enhance their learning attitude toward the “social network websites’ collaborative learning platform,” in turn elevating usage effect. This also means that if learners believe that using learning platforms is interesting and useful for learning, it would enhance their learning attitude toward “social network websites’ collaborative learning platform.” Furthermore, if learners have greater learning attitude, then they have greater satisfaction, learning effects, self-perceived usage effects, and future intention of continued usage for the learning platform. Finally, perceived ease of use has no significant influence on learning attitude, primarily because students are adept at using information technology such as tablet computers and browsers. Thus, the perceived ease of use of “social network websites’ collaborative learning platform” would not affect learning attitude, but perceived ease of use would indirectly affect learning attitude through perceived playfulness and perceived usefulness.

Research results show that the factor with greatest influence on learning effects is “perceived playfulness,” followed by “perceived usefulness.” This result corresponds to Huang et al. (2012), who point out that with diverse instructional methods and instructional design, information technology as a learning cognition tool has increasing conformity to modern education technology theory; conversely, without suitable instructional design, digital learning that only uses technological capabilities or satisfies technological novelty can only be supported for short periods of time. Information technology must carry out suitable adjustment and transformation in instructional materials, methods, and learning environments to realize their effects. Thus, from the perspective of learning effects, the instructional design aspect is used to support information technology, enhance learners’ positive attitude toward use, inspiring their learning motivation, in order to quickly and effectively assist learners achieve their learning objectives.
7. Conclusions and Future Work

This study presents a modified TAM model to explore the acceptance and usage effect of learners in the U-learning environment toward “social network websites’ collaborative learning platform,” and the explored factors include: collective efficacy and personal innovativeness in information technology, and their effect on “learning attitude” and “usage effect” is examined. Since social network websites’ collaborative learning platform is a new information technology for learners, for learners with higher personal innovativeness in information technology, they feel a greater sense of playfulness and ease of use. In addition, since this study uses social network websites’ collaborative learning platform to complete learning activities, learners have a higher level of confidence that the team members will complete the learning activities together, and would perceive more playfulness, usefulness, and ease of use. Finally, if learners have high playfulness and usefulness toward the platform, it would enhance their learning attitude in this learning platform, and influence usage effect; learners’ perceived ease of use would affect learning attitude and usage effect through playfulness and usefulness. Research shows that students can conduct learning activities through the social network websites’ collaborative learning platform. If they have a positive attitude toward platform design, such as playfulness and usefulness, it would have a positive effect on learning attitude and usage effect. This shows that if students use mobile devices to carry out learning activities outdoors, the social network website platform can be used for collaborative learning, and students believe that it is possible to enhance learning attitude and usage effect. This result indicates that students have a positive attitude toward social network websites’ collaborative learning platform, and there is also high learner acceptance.

This study suggests that future studies should take the perspectives of curricular develop evaluation and educational experiment research, for a composite analysis of students’ usage effect and acceptance of “social network websites’ collaborative learning platform,” and the production content, production process, internal and external usage environment of the learning platform of social network websites can also be integrated in analysis, to serve as a referential basis for future development of this type of learning. Due to time, manpower, and other resource restrictions, only students in a university in southern Taiwan are used as research subjects. The study does not consider the number of samples, scope, and computer literacy issues; these are limitations of this study. Thus, the research results and deductions are only applicable to the sample under this instance of testing. If later researchers can accommodate the related factors, it is suggested that the sampling scope and direction should be expanded, such as gender, different majors, and different computer literacy levels for future research reference and comparison.
addition, future researchers can focus on other theories, such as exploration of the effect of social cognitive theory and social network theory on learning effects, making further comparisons to this study to establish a more complete learning behavioral model.

REFERENCES


『結合電子繪本及 Facebook 之雲端學習平台建置與使用意圖探討』

A study of Cloud learning environment construction combined with E-story books and Facebook and exploration of users’ intension

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【摘要】資訊科技迅速發展，資訊教育隨之重要，而多媒體設計為培育資訊人才之重點課程。因此，本研究將建置一個結合電子繪本及 Facebook 之雲端學習平台，供學生在學習多媒體設計課程時可將作品上傳，並透過分享與討論的學習方式進行模仿學習，提升作品品質，培養學生之創造力。另外，結合社會互動、使用滿足等理論，探討學生在多媒體互動設計課程中透過此平台之學習行為與使用意圖，期望瞭解學生的需求與學習狀況之間的關係，研究結果除了對於學生透過雲端學習環境進行學習有相當貢獻外，亦可提供給相關課程進行教材設計搭配與教學模式改善之參考。

【關鍵詞】雲端學習、電子繪本、社群網站、社會互動理論、使用與滿足理論

Abstract: The rapid development of information technology, information education along with important information and multimedia design talents to nurture key courses. Therefore, this study will build a clouding e-learning platform combined with e-story books and Facebook for students in the multimedia design course. This platform can be uploaded through the sharing and discussion of learning to imitate learning, enhancing the quality of work, training student’s creativity. In addition, the platform combined with social interaction, using the theories meet to discuss student design courses in multimedia interactive platform through which learning behavior and intention to use. We expected to understand the needs of students with learning situation between the findings in addition to students learning through the cloud a considerable contribution to the learning environment. After construction this platform, the result of this project can be applied to other related course. The advantages of this platform provide an innovation teaching strategy and teaching material modify.

Keywords: cloud learning, e-story book, Facebook, social interaction theory, uses and gratifications theory
1. 前言

隨著資訊科技的迅速發展，資訊教育亦隨之重要。在資訊教育的專業培育上，軟體設計佔有相當重要地位，而多媒體設計乃為目前國內培育資訊人才之重點課程之一，因此，讓學生在學習多媒體設計之課程時能夠與實務結合且是一個刻不容緩的問題。本研究將建置電子繪本及 Facebook 之雲端學習平台，供大學生在學習多媒體設計課程時可將其完成之電子繪本作品上傳至此環境，透過分享與共同討論的學習方式進行模仿學習，提升整體作品之品質，亦能培養學生進行多媒體設計之創造能力。再者，學生所設計的作品，亦可將其直接交付教學現場使用，供相關教學之教師進行參考。最後，結合社會互動、使用滿足理論及承諾-信任理論，

探究大學生在雲端學習環境中進行多媒體互動設計課程學習之學習行為與使用意圖的探討，主要透過社會互動、需求滿足及承諾-信任理論，探討電子繪本平台嵌入至 Facebook 之合作學習方式，使用者對平台之需求、滿足及行為意願之探討，期望能夠深入瞭解學生的需求與學習狀況之間的關係，此研究結果除了對於學生透過雲端學習環境進行學習有相當貢獻之外，亦可在教學平台完成建置後，提供給其他相關課程進行教材設計搭配與教學模式改善。有鑑於此，本研究目的如下：(1) 建置 Facebook 之雲端學習平台應用於多媒體設計課程；(2) 瞭解雲端學習與 Facebook 結合對學生學習行為改變情況；(3) 評估學生在雲端學習平台進行學習過程中，其社會互動、需求滿足及社會影響間的關係。

2. 文獻探討

2.1. 雲端學習

雲端運算(cloud computing)是一種基於網際網路的運算方式，透過這種方式，共享的軟硬體資源和資訊可依使用者的需要提供給電腦或其他裝置。雲端科技對於教學與學習的影響，已悄悄的在我們的生活和學習之中占有一席重要的位置。許多人隨時隨地手中握著智慧型手機，不斷的在小小的螢幕上動作一致的滑來滑去，可見一斑。

2.2. 社群網站—Facebook

社群網站(Social Networking Sites)提供網路使用者與他人對話及交換、討論資訊與經驗的網際平台，使用者透過互動分享所產生的內容，不但具有社交性(social)且是資訊承載的媒介(media)，故又被稱之為社群媒體(Safko & Brake 2009)。社交媒體使用成員之間原生關係繫結緊密，易於進行訊息溝通與凝集群體智慧，人們透過社交媒體可以很容易的大規模的進行群我互動、散播自己創造的內容與發揮影響力(Eric et al., 2009)，社交媒體的高成長率、強黏著力以及其彙集成員互動與知識所創造的巨大價值，在資訊管理與知識傳播領域已受到相當大的重視。

媒體相依派別觀點認為，媒體本身的設計所產生的功能可以影響人的行為，對於社會媒體、社交行為派別觀點則認為透過社交過程會改變人的行為(Yoo & Alavi, 2001)；例如社交過程所產生的信任可能降低人們對不確定性與風險(Luhmann,1979)的感受，使得人們願意去進行知識的交流，提升進行知識分享行為的意圖(Chiu et al.,2006; Hsu et al.,2007; McEvily et al.,2003)，媒體科技與社會互動過程，將造成人們行為的改變，亦即是，人們行為的改變，不單只靠媒體科技，還有社會關係，使得媒體機能與社交過程成為促使人們行為改變的重要因素。
2.3. 多媒體設計—電子繪本

以電子為媒介為二十世紀的圖畫書佔有一席，而結合電子為媒介與圖畫書的新媒體可統稱為「電子繪本」，也可說是「電子書」。將紙本繪本藉由多媒體編製成電子繪本，不僅豐富故事情節之變化，而且比紙本繪本更加容易吸引到學習者的目光與注意力，學習者也可立即藉由聲、光、圖、動畫之變化與故事內容做互動，讓學習者很快進入自己所處的環境做連結。綜合上述幾點在電子繪本教育上之價值得知，紙本繪本的形式都侷限於文字與圖片為主，而電子繪本除了文字、圖片，更增加了聲音變化、影像及動畫等多媒體素材之呈現方式。電子繪本的出現，不僅可以讓學習者打開不同學習視野，更能豐富教師的教學資源，提升教學品質。

2.4. 使用意圖評估

為了更深入瞭解社群網站與雲端閱讀之現況與未來發展趨勢，本研究將以「Facebook」為例，探討電子繪本雲端閱讀與社群網站結合之學習平台的發展現況、影響使用者行為意圖之影響因素，並提供未來發展或研究之建議。本研究認為個體在社交環境(Social Environment)中進行群我互動的社交過程(Social Processes)與其社交行為(Social Behavior)之間具有相關影響性，因此本研究依據社交媒體結合雲端電子繪本學習平台的虛擬社群情境，基於使用滿足理論及社會互動理論，建構嚴謹且具體意涵的架構模型，資料蒐集針對社交媒體的使用者並有使用過專業虛擬社群「故事繪本雲端閱讀社群」之成員進行問卷發放，進行理論之驗證，進一步的了解需求滿足理論等相關因素對於虛擬社群成員參與行為的影響。

2.4.1. 使用與滿足理論

在大眾傳播的研究典範中，「使用與滿足」是最廣泛地被應用於網路使用行為研究的理論之一，用以探討閱聽人之選擇或是媒介使用的動機和行為。從 80 年代迄今，使用與滿足理論相繼有許多學者發展出許多不同的模式，當中最常被廣泛引用的就屬瑞典學者 Rosengren(1974)的模式。使用與滿足理論(uses and gratifications paradigm)主要目的在解釋人們如何在眾多傳播媒介中選擇特定的媒介，並闡明人們的心理需求，也就是促使人們使用特殊媒介的動機。使用與滿足的觀點為個人是積極的並具有目的，個人是根據需求來選擇媒介(Flanagin & Metzger, 2001)。此模式假設使用者的行為是有目標的並且都了解自己的需求(Cheung et al., 2010)。網際網路是一個多層面的技術，使用的方式與傳統媒介有些類似但並不完全相同(Flanagin & Metzger, 2001)。目的價值，自我發現，娛樂價值，社交強化，人際關係維持都是常被用來決定使用虛擬社群的動機(Cheung et al., 2010)。

2.4.2. 承諾—信任理論(Commitment-Trust Theory)

過去有許多學者與專家提出有關承諾的理論模型與架構，Morgan 及 Hunt(1994)所提出承諾—信任理論(Commitment-Trust Theory)之 KMV 模型(Key Mediating Variable Model)是最經典的。從眾多的情境因素中，Morgan 及 Hunt (1994)發現關係承諾與信任是解決合夥關係問題的關鍵，本研究中的電子繪本及 Facebook 之雲端學習平台可以透過合作學習模式，因此透過承諾—信任理論來解釋彼此的信任及關係維持。

關係承諾定義為「交換成員一方相信與另一方繼續維持關係是重要的，因此，會盡最大的努力，去維持此關係；亦即承諾的一方相信關係是值得維持的，並保證會無限期地持續下去。(譯自 Morgan & Hunt, 1994,p:23)」信任定義為「某一個團體信任交易夥伴的可靠性以及正直性的程度」，信任乃是屬於一種心理狀態，只要夥伴的一方對於其交易
夥伴之信賴以及正直產生信心時，信任將存在於夥伴雙方，信任的構成，使夥伴雙方傾向有密切關係的產生。因此 Morgan 及 Hunt (1994) 認為信任將會影響關係承諾。

2.4.3. 社會互動理論

社會互動理論，提出人-人互動、人-訊息互動、人-環境互動的三種社會互動型態。其中人的因素為心裡福祉、訊息之因素為功能性需求，即媒介使用動機、環境因素為社會性需求，即社會資本部分。

社會資本 (social capital) 泛指透過人與人之間的關係累積資源 (Coleman, 1988)。社會資本一般被視為在社交網路參與者之間互動積極的影響 (Helliwell & Putnam, 2004)，參與者時常在社交網路與他人互動，進而可以累積參與者和他人間的關係，因此參與者參與社交網路的積極性同時也會影響參與者社會資本的高低。社群網站隱含了聯繫、交友、溝通、串聯的特質，同時也有即時、互動、參與的功能，可以隨時隨地和一群人溝通互動，甚至可以擴大到世界的集體行為。對於年輕人來說，與同年齡人關係的建立與維護是很重要的，這些關係通常稱之為社會資本。社會資本具有彈性，尤為描述個人與他人的關係所能獲得的好處 (Steinfield et al., 2008)。許多研究結果表明，社群網站對於年輕人是必要的工具，因為他們透過社群網站維持友誼，因此 Facebook 對於年輕人的心理發展就扮演重要的角色 (Steinfield et al., 2008)。「關係」有助於創造社會資本，是年輕人心理發展的重要部份。有越來越多證據表明，網際網路的使用和社群網站，特別是 Facebook，皆與個人的自我意識和心理發展相關 (Steinfield et al., 2008)。人們期望透過社群網站的服務能夠維持這些關係 (Steinfield et al., 2008)。由此可以得知，電子繪本及 Facebook 之雲端學習平臺的使用與個人社會資本之間有關係的，這也是本研究想要探討的內容。

3. 研究方法

本研究主要發展於 Facebook 並結合之雲端學習平臺為主要目的，並且在完成平臺建置後，進行實際教學實驗，透過教學的實驗後，以社會互動、承諾-信任及使用滿足等相關理論，進行使用者對於電子繪本及 Facebook 之雲端學習平臺的評估，其系統架構如圖 1 所示。

![系統架構圖](image)

3.1. 雲端學習平臺與 Facebook 結合

在雲端學習平臺的結合部份，Facebook具有原始碼開放的特性，將可依照此一特性
進行相關元件的嵌入與匯入，可將自行開發的平台結合至Facebook中，因此本研究欲藉由社群互動之效用，除了能分享多媒體設計課程之電子繪本，藉由作品共享的方式拓展其設計視野之外，亦能透過同儕互動激盪出不同的火花，亦能增加學習的多元性，本研究擬進行開發之平台如圖2至圖5錯誤! 找不到参照來源。所示。

3.2. 教學設計與教材整合於雲端學習平台

本研究之教學部份，教學對象為嘉南藥理科技大學資訊管理系大學部學生，進行教學的課程為多媒體設計課程，該課程教學最終目的為希望學生在學期末時能夠設計出多媒體相關作品，因應本系多媒體課程核心技能規劃，目前以設計電子繪本為主，而本研究將以實際的教學後對於學生之學習成效進行分析，以瞭解學生透過雲端學習平台進行專題製作與分享時對其相關能力的影響。

![圖2 結合電子繪本及 Facebook 之雲端學習平台](image2)

![圖3 學習平台成功套用 FB 套件畫面](image3)

![圖4 學習平台─千言萬語畫面](image4)

![圖5 學習平台─發表留言畫面](image5)

3.3. 使用意圖評估問卷設計

在評估的架構中，參考需求滿足理論，將研究架構分成環境、學習過程及行為三個部份，針對社會互動需求及需求滿足及社會影響三個部分。進行學生使用電子繪本結合Facebook之合作學習平台的意圖評估，其使用意圖評估架構如錯誤! 找不到参照來源。所示。

3.3.1. 社會互動需求

社群成員參與網路社群的動機主要有(1)功能性需求：尋求專家解答(Hagel & Armstrong, 1997)或是點閱有用的、新的資訊(Chang et al., 1999; Jacobs, 2000; Bressler & Grantham, 2000)。透過社群進行交易與收集消費者情報(Hagel & Armstrong, 1997;
Zingale & Arndt, 2001; Huang et al., 2007)。某些企業也認為虛擬社群是一個有價值的知識管理系統(Gongla & Rizzuto, 2001; Hsu et al., 2007)。社會性需求：經由社群互動建立友好關係與友誼(Robert, 1999; Lee, Vogel & Limayem, 2003; Li et al., 2006a; Kozinets, 1999)。心理性需求：形成對社群的情感(Chiu et al., 2006; Hsu & Lin, 2008)、滿意(Lin & Lee, 2006; Kim et al. 2007; Chen, 2007)及愉悅(Gupta & Kim, 2007)。

3.3.2. 需求滿足

需求滿足過程參考承諾—信任理論，分成信任關係及關係承諾兩個部分。關係承諾定義為「交換成員一方相信與另一方繼續維持關係是重要的，因此，會盡最大的努力，去維持此關係；亦即承諾的一方相信關係是值得維持的，並保證會無限地持續下去(Morgan & Hunt, 1994)。」信任定義為「某一個團體信賴交易夥伴的可靠以及正直性的程度」，信任乃是一種心理狀態，只要夥伴的一方對於其交易夥伴之信賴以及正直產生信心時，信任將存於夥伴雙方，信任的構成，使夥伴雙方傾向有密切關係的產生。Mayer et al. (1995) 認為信任是一種風險承擔，組織間往來過程所產生的信賴經驗，使得雙方資訊分享頻繁，當信任與資訊分享達到某種程度之後，即產生關係承諾。若將虛擬社群視為一種非營利組織，成員的關係承諾將造成對該社群的高度參與，願意留在社群內活動(Gefen et al., 2003)。

3.3.3. 社會影響

本研究針對社會影響，衡量三個相關變數：「黏性」、「口碑」、「參與意願」，分別說明如下：黏性(Stickiness)指的是整個網站能夠讓使用者不斷的回流使用，以及能夠吸引路過的瀏覽者駐足，進而成為持續使用的成員。我們可以利用社群使用者待在某一個社群的時間有多長，成員使用的頻率有多高，以及成員每次瀏覽社群的時間所點入的社群層級深度有多大，這三個指標衡量一個虛擬社群是否具有高度的黏性(Gillespie et al., 1999)。口碑傳播是一種人與人直接溝通行為，透過雙方的討論與訊息交流因而對特定的商品或服務產生更多的資訊與認識，進而影響消費者對個體的評價與消費意願，故口碑傳播被認為是一種比較自主、可靠、值得信賴的資訊來源，並具有相當大的傳播與影響效果，廣為學者與實務界所重視及投入研究。口碑傳播的內容可分為正向的(Favorable/Positive)與負向(Unfavorable/Negative)，正向口碑是將使用後滿意的經驗告訴他人。負向口碑的發生通常是來自消費後的不滿意，告訴他人特定產品或服務不好的消費經驗或抱怨(Rinchins, 1983)，本研究所採取觀點為正向的口碑。參與意願的問卷設計部份，必須從理論架構中進行操作型定義，藉由操作型定義的確認後，即可依其進行各構面之定義，接續依照各構面的定義進行問卷的設計，本研究將節選自各文獻中具有較佳的信度與效度之量表來進行變數的操作與設計，並且針對問卷內的每一個題項一一與專家進行討論，藉此提升問卷之專家效度。

綜合上述，研究模式參考社會互動理論、需求滿足理論及信任-承諾理論及相關的文獻討論，針對使用者對於「結合故事繪本及 Facebook 之合作學習平台」之看法，提出13 個假說，如圖 6 所示。

4. 研究方法

4.1. 基本衡量
本研究所有测量构面以先前相关研究为基础，功能性需求、社会性需求及心理性需求：信任，关系承诺；黏性，口碑及参与意願。问卷以李克特综合尺度(Likert scale)七点量表来测量，从「非常不同意」到「非常同意」，分别以1~7 分进行测量。问卷调查项目透过少部分相关专家修正以适用在社群网站电子绘本学习平台。

4.2. 资料收集

透过网站问卷调查收集资料以验证所提出的研究模式。问卷是采取自我评估的方式，且放在一个知名的社交网站中，网站中的会员及非会员皆可以浏览及回答问卷。本研究针对有使用过社群网站合作学习平台的学生发放问卷，全部回收326 份问卷，删除无效应问卷，有效问卷填答率为83.7%。本研究将问卷之个人基本资料部分，其中51.39%为男性，48.61%为女性。年齡分布情形为20 岁以下的有48.61%、20 岁以上则为51.39%。學歷為大學以下的有19.12% 、大學學歷為69.32%、研究所以上學歷為10.76%。

5. 研究结果

實證資料使用最小平方法(Partial Least Squares, PLS)进行分析，同時检测填答者对构面地心理特質並及验證研究模式。PLS 在样本大小、衡量量表及资料分布上的限制較少且較是更有利的 (Rose, Clark, Samouel, & Hair, 2012)。本章将針對調查样本进行资料之分析与讨论，共分为受測者資料之人口统计分析、研究調查工具之信度分析及效度分析、以及研究模式及假设检定。

5.1. 信度分析

信度(reliability)指的是测量结果的一致性(consistency)或稳定性(stability)，也就是研究者對於相同的或相似的现象(或群體)进行不同的测量(不同形式的或不同时间的)，其所得的结果一致的程度。Nunnally (1978) 認为 Cronbach’s α 係數要在0.7 以上才算是高接受的範圍。根據本研究结果，可发现八個構面之 Cronbach’s α 係數界於0.86~0.94 之間，皆符合學者提出 Cronbach’s α 係數須高於0.7 之標準值，由此可知本研究问卷具有相当高之信度水準，且在此阶段並無删減問項之必要。

表4 信度、收敛效度及区别效度分析结果

<table>
<thead>
<tr>
<th>构面名称</th>
<th>M</th>
<th>SD</th>
<th>CR</th>
<th>AVE</th>
<th>FR</th>
<th>SR</th>
<th>PR</th>
<th>CMT</th>
<th>TRT</th>
<th>STK</th>
<th>WOM</th>
<th>INT</th>
</tr>
</thead>
<tbody>
<tr>
<td>功能性需求 (FR)</td>
<td>5.12</td>
<td>0.82</td>
<td>0.95</td>
<td>0.54</td>
<td>0.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>社会性需求 (SR)</td>
<td>5.23</td>
<td>0.83</td>
<td>0.95</td>
<td>0.54</td>
<td>0.68</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>心理性需求 (PR)</td>
<td>5.01</td>
<td>0.90</td>
<td>0.94</td>
<td>0.60</td>
<td>0.58</td>
<td>0.70</td>
<td>0.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>關係承諾 (CMT)</td>
<td>4.92</td>
<td>1.01</td>
<td>0.93</td>
<td>0.72</td>
<td>0.71</td>
<td>0.70</td>
<td>0.64</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>信任關係 (TRT)</td>
<td>4.95</td>
<td>0.96</td>
<td>0.93</td>
<td>0.74</td>
<td>0.70</td>
<td>0.69</td>
<td>0.67</td>
<td>0.83</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>黏性 (STK)</td>
<td>4.65</td>
<td>1.02</td>
<td>0.91</td>
<td>0.71</td>
<td>0.63</td>
<td>0.61</td>
<td>0.56</td>
<td>0.61</td>
<td>0.66</td>
<td>0.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>口碑 (WOM)</td>
<td>4.90</td>
<td>1.12</td>
<td>0.95</td>
<td>0.78</td>
<td>0.67</td>
<td>0.60</td>
<td>0.54</td>
<td>0.70</td>
<td>0.77</td>
<td>0.65</td>
<td>0.73</td>
<td>0.88</td>
</tr>
<tr>
<td>參與意願 (INT)</td>
<td>5.07</td>
<td>0.99</td>
<td>0.94</td>
<td>0.74</td>
<td>0.70</td>
<td>0.61</td>
<td>0.51</td>
<td>0.57</td>
<td>0.70</td>
<td>0.70</td>
<td>0.64</td>
<td>0.81</td>
</tr>
</tbody>
</table>
5.2. 測量模式

信度、收斂效度及區別效度分析結果如表 4 所示。每模式中的每一個構面之組成信度皆大於 0.80，每一個構面的平均變異萃取量(average variance extracted, AVE)皆大於推薦值的 0.5 以上(Hair, Black, Babin, Anderson, & Tatham, 2006)，這代表所提出的假設構面超過一半以上的項目是有效的，此條件指標為計算構面之各測量問項對該構面的變異解釋力，若平均變異萃取量(AVE 值)愈高，表示該構面有愈高的信度與收斂效度。另外，為了檢驗區別效度，本研究比較個別構面間的平均變異萃取量及共享變異(Fornell & Larcker, 1981)。此分析說明構面間的共享變異必須低於個別構面的平均變異萃取量(AVE)。整體而言，衡量模式有適當的信度、收斂效度及區別效度。

5.3. 結構模式

本研究採用統計軟體 SmartPLS 2.0 進行研究模式之檢定。由於 PLS 並不提供整體模式之配適度，而是以解釋力(R²)來檢測結構路徑的預測能力。

![圖6 研究模式分析結果](image)

註：
1. M 為平均值、SD 為標準差、CR 為組成信度、AVE 為平均變異數。
2. 對角線為 AVE 值的平方根，非對角線為共享變異對角線內數值為各構面間之相關係數值。

注：
* 表示 p<0.05, ** 表示 p<0.01, *** 表示 p<0.001.

本研究在參數的估計上採用拔靴法(Bootstrapping)，是一種無母數估計方法，透過對樣本資料的重新抽樣(Re-sampling)，來估計統計量的分配。本研究根據Chin (1998)的建議，將重新抽樣的次數設為 500，以作為每條結構路徑之估計值的顯著性檢定依據。根據兩階段評估模式及拔靴法(Bootstrapping)重新取樣技術，標準化路徑分析及顯著性如圖 6 所示。所提出的假說結果如下：功能性需求及社會性需求對關係承諾(β = 0.175, β = 0.142)及信任(β = 0.375, β = 0.247)有顯著的影響，另外，心理性需求對
信任(β = 0.276)有顯著的影響；信任對關係承諾(β = 0.573)、黏性(β = 0.493)、口碑(β = 0.425)及參與意願(β = 0.389)都有顯著影響，因此，H7、H8、H9及H10成立；關係承諾(β = 0.196)對黏性(β = 0.345)、口碑(β = 0.377)及參與意願(β = 0.389)都有顯著影響。最後，心理性需求對關係承諾並沒有顯著的影響，因此，研究模式中，假設1至假設13，除了假設5之外，其餘的12個假設皆成立。功能性需求、社會性需求、心理性需求及信任對關係承諾等四個因素的解釋能力為73.3％，功能性需求、社會性需求及心理性需求等三個構面對於信任的解釋能力為61.9％，信任及關係承諾對黏性、口碑及參與意願的解釋能力分別為44.3％、54.3％及53.7％。

6. 討論與研究意涵

本研究成果為建置一套電子繪本及 Facebook 之雲端學習平台，且實驗於多媒體設計課程上，且實施教學實驗過程中交由學生進行電子繪本之設計，透過雲端學習平台進行完成電子繪本設計的分享與討論。從學習的角度出發，此一平台可供未來應用於專題設計等相關課程之教師進行使用與參考，另外學生透過雲端學習平台進行專題的設計，將有助於學生設計相關專題，透過同儕的相互影響作用，使學生設計之成果能夠進一步提升成果品質。從使用與滿足理論的觀點出發，整合社會互動理論，提出人-人互動、人-訊息互動、人-環境互動的三種社會互動型態，以及承諾-信任理論，針對大學生在雲端學習環境中進行多媒體互動設計課程學習之學習行為與使用意圖的探討，研究結果顯示社會互動理論中的功能性需求、社會性需求及心理性需求對信任關係有顯著的影響關係，且功能性需求影響最大，另外，功能性需求、社會性需求及信任關係對黏性、口碑、參與意願的三個構面皆會透過需求滿足的過程，對社會影響之行為機構，即黏性、口碑及參與意願產生影響。

7. 結論與未來研究方向

本研究之未來研究部份，將可就三個部份進行說明：第一個部份為教學未來發展，此一平台可供未來教學時之參考，並且可以將其分享於網路上，能有助於提升教學品質。另一方面，使用雲端教學平台進行教學的過程當中，亦可提供教師另一種教學的方式。第二個部份為學習，可考慮學習者的個人特質、學習風格等等因子對使用雲端學習平台進行教學的學習成效影響分析。第三個部份也是最重要的一個部份，此一部份是使用電子繪本設計的分享與討論。整體而言，若能發展本雲端學習平台，則可對於有著在學習環境進行學習有相當貢獻之外，亦可在教學平臺完成建置後，提供給其他相關課程進行教材設計搭配與教學模式改善。

參考文獻


因受限於論文篇幅限制，若讀者對於詳細參考文獻有興趣，請洽作者。