Examining Student Satisfaction and Gender Differences in Technology-Supported, Blended Learning

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ABSTRACT

Recently, blended learning has become popular in higher education. In this study, we aim to investigate influential factors that could impact student learning in this young and relatively immature environment. Factors from three perspectives – students themselves, instructors, and institutional support – were examined. Specifically, these factors are students' computer self-efficacy, instructor characteristics, and facilitating conditions. A research model was developed to systematically assess their impacts on students' perceived accomplishment, perceived enjoyment, and satisfaction toward the blended class. We also explored the gender differences by testing the research model on the two genders respectively. Interestingly, we found that for female students all three factors had significant impacts on their perceived accomplishment and perceived enjoyment, which in turn significantly impacted their learning satisfaction; however, for male students, no significant impact was found from computer self-efficacy to either perceived accomplishment or perceived enjoyment (the other two factors were significant).

Keywords: Blended learning, User satisfaction, Enjoyment, Student attitudes

1. INTRODUCTION

Creation and adoption of new instructional approaches that can better assist college students' learning needs and help increase their engagement has been a major focus in higher education over the years. With the increased popularity and advancements in information technology (IT), technology-supported learning has gained much attention in contemporary higher education. Over the years, higher education has gone through three generations of evolution (So and Brush, 2008). The first generation is the traditional, face-to-face instruction in which students and their instructors meet physically in a designated classroom (So and Brush, 2008). During the class time, instructors disseminate knowledge to students through lecturing or other instructional approaches. The second generation is e-learning (also called distance learning) which is made possible because of the increased maturity and accessibility of computer and network technologies (Kulkarni et al., 2013; So and Brush, 2008; Sun et al., 2008). Researchers have found that learners perceive e-learning as effective since it can provide self-paced and multimedia instruction (Liaw, Huang, and Chen, 2007). However, concerns about e-learning also have been identified in previous research, such as the time and labor cost to set up, maintain, and use the e-learning environment (Sun et al., 2008). In addition, such environment may give students a feeling of separation from both their instructors and classmates, and students without high motivation may have difficulties in catching up with the class (eLearner Iowa State University, 2014). Thus, it is not surprising that some students still prefer face-to-face instruction.

Recently, the third generation – the blended learning (also called hybrid learning in some literature) – has come into higher education, aiming to combine the advantages of both the face-to-face instruction and e-learning in order to provide a better learning environment to students (Ahmed, 2010; Asarta and Schmidt, 2013; Padilla-Meléndez, Aguila-Obra, and Garrido-Moreno, 2013; So and Brush, 2008). Blended learning is defined as the "combination of learning delivery methods, including most often face-to-face instruction with asynchronous and/or synchronous computer technologies" (So and Brush, 2008, p. 321), and it enables students to conduct "both online and offline interaction" (So and Brush, 2008, p. 322). In other words, blended learning utilizes a variety of teaching methods from both face-to-face instruction and e-learning. In blended learning, students have opportunities to meet their instructors and classmates face-

to-face in the physical classroom, and also can perform certain class activities online by themselves. In terms of time frame, e-learning is generally believed to originate during the 1980's (Moore, Dickson-Deane, and Galyen, 2011), while blended learning started around 2000 (Ahmed, 2010).

Although the idea of blended learning has existed for over a decade, surprisingly, relatively fewer academic studies have been done on it (Tselios, Daskalakis, and Papadopoulou, 2011). The related existing research mainly has focused on describing and evaluating certain class structures (Asarta and Schmidt, 2013; So and Brush, 2008). Much less has systematically and empirically investigated factors that could influence the success of the blended learning environment (Ahmed, 2010). To address such gap, this study developed a research model to systematically examine the impacts of students' computer-self efficacy, instructor characteristics, and facilitating conditions on students' perceived accomplishment, perceived enjoyment, and satisfaction toward blended learning. We include the three independent variables – students' computer-self efficacy, instructor characteristics, and facilitating conditions – because they focus on different perspectives, all of which could play important roles in influencing the success of blended learning. Specifically, students' computer-self efficacy is a factor related to students themselves. Since blended learning always needs the support of information technology and systems, students' computer-self efficacy could be an influential factor to examine. Instructor characteristics are an important instructor-related factor, which could also influence students' learning in the blended environment. In addition, from the infrastructure perspective, to make a blended class successful, adequate institutional and technical support is needed. Thus, facilitating conditions are another factor to consider.

Previous research has identified certain gender differences in terms of Internet usage and computer systems adoption (Jackson et al., 2001; Van Slyke, Comunale, and Belanger, 2002). For example, women and men demonstrated different online shopping patterns (Van Slyke, Comunale, and Belanger, 2002), and they used the online communication platforms to fulfill different needs (Jackson, et al., 2001; Seale, Ziebland, and Charteris-Black, 2006). In addition, different factors were identified to influence women's and men's adoption of computer systems separately, such as that ease of use was more influential on women's system use intentions and perceived usefulness was more influential toward men's intentions (Nel and Raleting, 2012). In education, previous research also identified considerable gender differences in various aspects, such as team effectiveness (Dunaway, 2013) and computer self-efficacy (He and Freeman, 2010). To investigate the possible existence of gender differences associated with our proposed research model, we also conducted an exploratory examination by testing the research model on male and female students respectively. Interestingly, we found a considerable gender difference on the impacts of students' computer self-efficacy on their perceived accomplishment and enjoyment. Both impacts were statistically significant for females, but not for males.

This article is organized as follows: Section 2 provides the theoretical background and the hypothesis development. Section 3 describes the research method. Section 4 presents data analyses and results. Section 5 discusses the research contributions, implications, and limitations of this study. Then, Section 6 concludes the article.

2. THEORETICAL BACKGROUND AND HYPOTHESES

In this section, the three influencing factors on student learning (i.e., computer self-efficacy, instructor characteristics, and facilitating conditions) are discussed with the detailed hypothesis development. We then present the three learning assessment factors (the dependent variables) investigated in this study, including students' perceived accomplishment, perceived enjoyment, and satisfaction, followed by a summary of prior research on gender differences.

2.1 Computer-Self Efficacy

Various factors that could influence student learning and their learning outcomes have been studied in existing literature. One of the most widely adopted factors relate to students themselves is their self-efficacy, which is referred to as one's own perception of his/her levels of ability to accomplish a given task (Akbulut and Looney, 2007; Rosson, Carroll, and Sinha, 2011). Previous research found that self-efficacy was positively associated with students' orientation toward careers in computer and information systems related areas (Rosson, Carroll, and Sinha, 2011). Students with higher self-efficacy tended to be more willing to choose computer and information systems as the area of study (Rosson, Carroll, and Sinha, 2011). When studying students' behaviors in information security, Yoon, Hwang, and Kim (2012) found that computer efficacy had a significant positive effect on their behavior intention to practice information security.

Derived from the broader concept of self-efficacy, computer self-efficacy (CSE) is about one's self-efficacy specifically for computer and information technology (Hassan, 2003; Selim, 2007). Roca, Chiu, and Martinez (2006) studied CSE in e-learning context and found that learners' CSE could significantly influence their perception of the ease of use and satisfaction of the e-learning system. Johnson, Hornik, and Salas (2008) found that CSE could significantly influence e-learning effectiveness in terms of course instrumentality, course performance, and course satisfaction. Paraskeva, Bouta, and Papagianni (2008) investigated CSE among educators and found that it had a significant impact on their integration and development of modern technologies in teaching. In the blended learning environment, a few studies examined and found a significant relationship between students' CSE and their expectations on the learning performance in this environment (Chen, 2014; Wu, Tennyson, and Hsia, 2010).

Previous research found that learners with higher self-efficacy tended to form a more positive feeling toward the subject of learning and were more willing to learn (Durndell and Haag, 2002; Roca, Chiu, and Martinez, 2006; Thatcher and Perrewé, 2002). When assessing students' learning in Web development, Zhang and Dang (2015) found that students' self-efficacy toward Web development could significantly influence both their perceived accomplishment and perceived enjoyment. In the blended learning

environment, it is argued that increases in CSE can improve students' persistence and their willingness to put more effort in learning (Wu, Tennyson, and Hsia, 2010). If students have higher CSE, they will possibly perceive the way of teaching (in most cases technology supported) in the blended class as more useful and valuable, which in turn increases their expectations on performance and pleasure in learning (Wu, Tennyson, and Hsia, 2010). Thus, we hypothesize:

H1a: Students' perceived computer self-efficacy will positively influence their perceived accomplishment in the blended class.

H1b: Students' perceived computer self-efficacy will positively influence their perceived enjoyment in the blended class.

2.2 Instructor Characteristics

Previous research found that instructor factors could significantly influence students' learning outcome (Sun et al., 2008). Instructor characteristics have been measured in different ways based on the research context (Selim, 2007; Sun et al., 2008). For example, Sun et al. (2008) studied instructor characteristics as the instructor response timeliness and instructor attitude toward the technology in an e-learning context, and found that instructor attitude toward the technology could significantly influence learners' satisfaction. If the instructor shows his/her own interest in teaching the subject, students tend to gain a positive feeling in learning the subject (Sun et al., 2008). Selim (2007) developed a more comprehensive measure of instructor characteristics with items about instructor attitude toward technology, teaching style, and control of technology.

When applying to the blended learning context, previous research found that instructor characteristics could significantly influence students' acceptance of the blended learning environment since they need to better motivate and guide students in this learner-centric environment (Ahmed, 2010). Thus, the instructor's personal characteristics as perceived by students could also influence students' own levels of affection associated with their learning process as well as their sense of accomplishment. So, we hypothesize:

H2a: Instructor characteristics will positively influence students' perceived accomplishment in the blended class.

H2b: Instructor characteristics will positively influence students' perceived enjoyment in the blended class.

2.3 Facilitating Conditions

Facilitating conditions are about an individual's belief on the existence of organizational and technical support of using an information system (Tromp and Pechenizkiy, 2011; Venkatesh et al., 2003). This concept has been applied to investigate technology-support learning, especially e-learning. For example, Teo (2010) developed and validated a set of measures for e-learning acceptance, focusing on three constructs – tutor quality, perceived usefulness, and facilitating conditions. For facilitating conditions, after conducting a series of factorial validity and reliability tests, a measurement instrument with four items were obtained (Teo, 2010). When examining the adoption of the Web-based learning system, Tarhini, Hone, and Liu (2013) found that facilitating conditions (as well as computer self-efficacy) could significantly influence students' actual system usage behavior. Davis, Vician, and Buche (2012) examined the relationship between facilitating conditions and students' performance in e-learning for non-technology intensive courses, but didn't find such relationship to be significant.

When examining technology-related supporting factors in the blended learning environment, previous research has investigated the impacts of system quality, information quality, and service quality on learners' behavioral intention (Al-Busaidi, 2012), without specifically looking into the general factor of facilitating conditions. In our study, we believe facilitating conditions is an important factor to examine in blended learning, since this learning environment is considered as more complex than traditional ones with both the in-class and online components, and it can be expected that more support is needed for students to get familiar with and make effective use of this environment. For the online component, similar to e-learning, sufficient technical support on students' use of the online learning management system and other related technologies is also needed and plays an important role in their learning. Thus, if the student perceives there is enough and effective support for conducting both the in-class and online activities, he/she would be able to adapt to this learning environment more easily and better enjoy the flexibility and learner-centric idea brought by the blended class. This could then lead to a high level of enjoyment in their learning in the blended class, and an increased sense of accomplishment. Therefore, we hypothesize:

H3a: Facilitating conditions will positively influence students' perceived accomplishment in the blended class.

H3b: Facilitating conditions will positively influence students' perceived enjoyment in the blended class.

2.4 Perceived Accomplishment, Perceived Enjoyment, and Satisfaction

Different factors have been developed to assess information systems (IS) success, such as satisfaction, perceived accomplishment, and perceived enjoyment (Heijden, 2004; Venkatesh et al., 2003), which also can be applied in the education context to examine student learning success. In this study, we adopt all three of them as the dependent variables to examine.

According to the IS Success Model, satisfaction is a widely adopted means to measure users' opinions of an information system, and it is one major measure for assessing the success of an information system (DeLone and McLean, 1992, 2003). It is argued as a measure of "successful interaction by management with the information system" (DeLone and McLean, 1992, p. 68). Satisfaction is defined as "the extent to which users believe that their needs, goals, and desires have been fully met" (Mohammadi, 2015, p. 364). In technology-supported learning, satisfaction has been applied to assess students' perceptions toward their learning in various classes and contexts. For example, Mohammadi (2015) examined students' satisfaction on e-learning and its enabling system in Iran, and found that various quality-related factors (including educational,

service, technical system, and content and information quality) could significantly influence students' satisfaction. In the blended learning environment, Wu, Tennyson, and Hsia (2010) studied student satisfaction as the dependent variable and found that both students' performance expectations and learning climate were significant influencing factors.

In addition to satisfaction, students' perceived accomplishment also has been used as a measure of the learning outcome in education (Akbulut and Looney, 2007). For example, Pursell (2009) used student accomplishment as an assessment of an innovative teaching method that gave students the right to revise syllabus to select topics of their interest. Firth and Wagner (2007) examined the importance and success of learning foreign languages from the perspective of social accomplishment that learners could gain out of it. However, little research has been found to investigate students' perceived accomplishment in the blended learning environment.

The third dependent variable used in this study is perceived enjoyment (or playfulness) which has been widely used to assess the adoption of the information systems and technologies (Heijden, 2004). Perceived enjoyment is generally defined as the extent to which users perceive the information system or technology being used to be enjoyable (Heijden, 2004). In education, Ozkan and Koseler (2009) studied different types of learners' attitudes and found that their perceived enjoyment of the learning process was the most important one. When examining the e-learning system, Cheng (2011) found that system response, system interactivity, system functionality, and students' learning goal orientation were antecedents of students' perceived enjoyment, which then influenced their attitude toward use and intention to use the e-learning system. In the blended learning environment, Padilla-Meléndez, Aguila-Obra, and Garrido-Moreno (2013) found that perceived playfulness significantly influenced students' perceived usefulness, ease of use, and attitude toward the blended learning system (the Moodle system that was used to support the online portion of their blended class).

Previous research in computing education has found that students' sense of personal accomplishment can significantly influence their interest in learning (Akbulut and Looney, 2007). When students have a high level of enjoyment in class, they are more likely to develop a passion of learning (Nemanich, 2009). Such effects can also be expected in the blended learning environment. When taking the blended class, if the student has a strong sense of accomplishment in both the in-class and online learning activities, he/she tends to have a positive attitude toward learning in such class, which can then lead to an increased level of learning interest and satisfaction. Similarly, if the student perceives his/her learning experience in the blended class as enjoyable and hedonic, he/she tends to gain more passion in learning and feel more positively on that his/her learning needs have been met. Based on their definitions, perceived enjoyment is about one's hedonic perception (Heijden, 2004), and satisfaction refers to the extent to which an individual believes his/her needs and goals (in our case they are learning-related needs and goals) have been met (Mohammadi, 2015). Therefore, it can be expected that perceived enjoyment will influence satisfaction. Thus, we propose:

H4: Students' perceived accomplishment will positively influence their satisfaction toward the blended class.

H5: Students' perceived enjoyment will positively influence their satisfaction toward the blended class.

Table 1 shows a summary of the proposed hypotheses.

2.5 Gender Differences

Understanding gender and its role has been an important task in information systems literature. A vast amount of studies have investigated gender impact in areas such as feedback utilization (Djamasbi and Loiacono, 2008), IT adoption (Venkatesh and Morris, 2000), online trust (Midha, 2012), and blogger switching behavior (Zhang et al., 2009).

Online gender differences refer to the differences between women and men in their Internet use (Bimber, 2000). At the early stage of Internet use, the main online gender difference was that there were more men than women to use the Internet. For example, as in 1999, 53% of U.S. and Canadian Internet users were men and 47% were women (CommerceNet, 1999). However, with the recent advance and development in Internet technologies, such online gender difference is believed to be less significant (Pew Internet and American Life Project, 2008). Instead, how the two genders utilize the Internet in different ways have become the new focus of online gender differences (Harp and Tremayne, 2006).

Hypothesis	Path	Impact
H1a	Perceived Computer Self-Efficacy -> Perceived Accomplishment	+
H1b	Perceived Computer Self-Efficacy -> Perceived Enjoyment	+
H2a	Instructor Characteristics -> Perceived Accomplishment	+
H2b	Instructor Characteristics -> Perceived Enjoyment	+
H3a	Facilitating conditions -> Perceived Accomplishment	+
H3b	Facilitating conditions -> Perceived Enjoyment	+
H4	Perceived Accomplishment -> Satisfaction	+
H5	Perceived Enjoyment -> Satisfaction	+

Table 1. List of Proposed Hypotheses

Many studies have been done to systematically examine online gender differences in various ways (Jackson et al., 2001; Seale, Ziebland, and Charteris-Black, 2006; Van Slyke, Comunale, and Belanger, 2002). For example, Van Slyke, Comunale, and Belanger (2002) examined online gender differences in terms of online shopping and found that women viewed online shopping less favorable than men. They proposed several suggestions to improve women's perceptions of online shopping, such as increasing a sense of social community, providing accurate descriptions and quality images, and reducing the risk involved in purchasing online. In another study, Jackson et al. (2001) found that women were more likely to use the Internet as a communication tool while men tended to use it as a way of information seeking. Seale, Ziebland, and Charteris-Black (2006) analyzed Web forum discussions of cancers and found that women tended to join the discussions related to emotional support and the impact of illness to others, while men tended to discuss more about treatment information, medical personnel and procedures.

Studies specifically looking at gender differences in adoption of new technology have often focused on factors identified in the UTAUT2 model (Venkatesh, Thong, and Xu, 2012) and its predecessors. Venkatesh and Morris (2000) found women's intentions to use a new technology were more influenced (than men's) by ease of use and by social norms (expectations of bosses and other respected authorities). A study of intentions to use chat rooms found similarly that women's intentions to be more influenced than men's by normative pressure (Nysveen, Pedersen, and Thorbjornsen, 2005) and that study also found women to be more influenced than men by perceived enjoyment in using the product. Nel and Raleting (2012) found that ease of use was more important in affecting women's intentions and perceived usefulness was more important in explaining men's intentions to use cell phone banking services. Ahuja and Thatcher (2005) found that women were more negatively impacted than men by quantitative overload (work-life balance issues) when it came to willingness to innovate in the use of technology, and Ahuja (2002) noted that women are perceived by themselves and by other as having primary responsibility of child-rearing and housework, and thus may be more sensitive to overload.

In technology-supported learning, previous research also identified considerable gender differences (Beyer, 2008; Dunaway, 2013; He and Freeman, 2010). When studying student teamwork toward problem-based learning in IS projects, Dunaway (2013) found significant gender differences in the relationships between a team member's awareness of his/her own emotions and perceived team effectiveness, as well as between the management of others' emotions and perceived team effectiveness. In another study, He and Freeman (2010) investigated gender differences in terms of computer knowledge, computer anxiety, current computer experience, and their impacts on students' general computer self-efficacy. They found that female students had less computer knowledge and fewer computing experiences than male students. In addition, female students were more anxious about using computers and presented lower levels of general computer self-efficacy when compared with their male counterparts. When studying gender differences on computer self-efficacy, Beyer (2008) found that female students' computer self-efficacy was much lower than that of male students; however, they had more positive attitude toward the IS field, IS courses, and their instructors than male students did.

In this study, in addition to examining the proposed hypotheses, we also investigate the potential gender differences associated with the research model. Since there is a lack of theoretical support of evidence from existing literature, we don't specifically propose any hypothesis on gender differences in this study. We conduct the exploratory analysis to investigate the existence of gender differences by testing the research model on males and females separately. This way of investigating gender differences has been adopted in recent literature (Padilla-Meléndez, Aguila-Obra, and Garrido-Moreno, 2013).

3. METHOD

3.1 Study Site

Our study site is an introduction to computer information systems course using the blended instructional method, at a major public university located in the United States. It is a freshman-level course that incorporates both fundamental concepts related to information systems and hands-on Microsoft Office 2013 skills instruction. The course is required for numerous majors across the university and regularly has enrollments nearing 1,000 students each semester. Multiple sections of the course are offered and taught by different instructors. All aspects of the course are tightly coordinated across sections.

Various online and offline instructional approaches have been adopted in the class. First, the course employs an online textbook, online assessment software, and Blackboard Learn (http://www.blackboard.com/), a standard course management system. The online component is designed so students may work independently, outside of class time, at their own pace and on their own schedule. Second, students are required to create weekly outlines of the assigned online chapter readings which are then brought to class for use in discussions and other related activities. Third, students are assessed each week through a pre-quiz using the standard test bank within Blackboard Learn that is taken after the reading, an in-class group quiz, and a post-quiz taken after the week's in-person class meeting to provide one more point of concept reinforcement.

For the hands-on learning of Microsoft Office 2013 software applications, students are required to watch a series of video lessons embedded in the online digital textbook that systematically walk them through how to create a Word document, Excel spreadsheet workbook, Access database, and PowerPoint presentation. Students download start files for each software program and then match the instruction in each video segment by completing the tasks in their own files. At the end of the lessons, students have completed an entire project that encompasses all the skills required for proficiency.

3.2 Research Process and Measure

Survey method was used in this study. The survey invitation was sent to all students who enrolled in the class a few weeks before the end of the semester. We believe that this timing is appropriate as students already experienced and

were familiar with the various learning methods used in the class. Extra credit (1% of total course points) was provided as an incentive for students' voluntary participation. Each participant completed the survey with a set of questions using a 7-Likert scale, with 1 being "strongly disagree" and 7 being "strongly agree."

To measure computer self-efficacy, we adopted and condensed the measures of efficacy from Law, Lee, and Yu (2010) and measures of student characteristics from Selim (2007), with wording changes to fit the context of this study. To measure instructor characteristics, we condensed and adopted the items from Selim (2007) with changes to fit the study context. Measures on facilitating conditions were adapted from Venkatesh et al. (2003) and Selim (2007). Measures on perceived accomplishment and enjoyment were adapted from Staples, Wong, and Seddon (2002) (about personal accomplishment) and Heijden (2004), respectively. Satisfaction measures were adapted from Bhattacherjee (2001).

4. DATA ANALYSIS AND RESULTS

4.1 Descriptive Statistics and the Difference between Means

In total, 583 completed responses (all usable) were received from a total of 854 students registered in 13 sections of the class (a response rate of 68.3%). Table 2 shows the descriptive statistics and the mean values of each construct between the two genders. The average age of the participants was about nineteen and half. On average, they had been in college for one and half years. Among them, 263 were males and 320 were females. For the mean values across different constructs, males' perceptions on their computer self-efficacy and enjoyment were higher than those of females, while females' perceptions on facilitating conditions and accomplishment were higher than those of males. The mean values toward instructor characteristics and satisfaction between the two genders were very close to each other. Interestingly, the largest gap (difference) among the mean values between the two genders was on computer self-efficacy (5.542 for males and 5.129 for females). By conducting the independent group t-tests (two-tailed) on all constructs, we found that the differences on computer self-efficacy (p-value < 0.001) and perceived enjoyment (p-value = 0.045) were statistically significant between the two genders. No significant results were found on other constructs. This, once again, highlights the most salient gender difference identified which is computer self-efficacy. In addition, no significant difference was found in either age or number of years at college with respect to gender.

4.2 Measurement Model Assessment

Structural equation modeling (SEM) (Oliveira, Cherubini, and Oliver, 2013; Xu, Lin, and Chan, 2012) techniques were used to assess the research model. Specifically, Smart PLS 2.0 (M3) beta (Ringle, Wende, and Will, 2005; Xu, Lin, and Chan, 2012) was utilized to conduct the analyses. Reliability and validity tests were conducted for the latent constructs in the research model. Table 3 shows the reliability test results. All item loadings are greater than the threshold value of 0.7 (Au, Ngai, and Cheng, 2008) and statistically significant. In addition, the Cronbach's alpha values for all constructs are greater than the 0.7 guideline (Hair et al., 1998; Nunnally, 1978).

Table 4 shows the composite reliability, average variance extracted (AVE), square root of AVE, and correlations among constructs. The composite reliability values are all above the recommended level of 0.70, indicating adequate internal consistency between items (Au, Ngai, and Cheng, 2008). Convergent validity is demonstrated as the AVE values for all constructs are higher than the suggested threshold value of 0.50, which is the same as the requirement of the square root of AVE to be at least 0.707 (Gefen, Straub, and Boudreau, 2000). Comparing the square root of AVE with the correlations among the constructs indicates that each construct is more closely related to its own measures than to those of other constructs, and discriminant validity is therefore supported (Chin, 1998).

4.3 Structural Model Assessment and Hypothesis Testing

Figures 1 and 2 show the PLS testing results of the research model for the two genders, respectively. For male students, the results showed that instructor characteristics could significantly influence both their perceived accomplishment (path coefficient = 0.250, t = 9.042) and perceived enjoyment (path coefficient = 0.278, t = 6.270). Therefore, H2a and H2b were supported. Significant impacts were also found from facilitating conditions to both male students' perceived accomplishment (path coefficient = 0.565, t = 16.490) and perceived enjoyment (path coefficient = 0.228, t = 5.512), in the support of both H3a and H3b. In addition, both perceived accomplishment (path coefficient = 0.227, t = 8.384) and perceived enjoyment (path coefficient = 0.710, t = 25.666) significantly influenced their satisfaction. So, H4 and H5 were supported. However, no significant impacts were found from computer self-efficacy to either perceived accomplishment or perceived enjoyment for male students. Thus, H1a and H1b were not supported on male students. Instructor characteristics and facilitating conditions together explained 55.6 percent (R^2 = 0.556) of the variance of perceived accomplishment and 20.9 percent (R^2 = 0.209) of the variance of perceived enjoyment, which in turn explained 75.4 percent (R^2 = 0.754) of the variance of satisfaction.

All Students		
Item	**Mean**	**Std. Dev.**
Age	19.419	2.74
Number of Years at College	1.583	0.818

Male vs. Female Students					
	Male (263 students)		**Female (320 students)**		**T-Test**
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**p-value**
Computer Self-Efficacy	5.542	1.373	5.129	1.405	<0.001**
Instructor Characteristics	6.169	1.240	6.177	1.326	0.931
Facilitating Conditions	5.625	1.389	5.802	1.302	0.082
Perceived Accomplishment	5.379	1.540	5.430	1.538	0.676
Perceived Enjoyment	4.972	1.611	4.725	1.601	0.045*
Satisfaction	5.011	1.525	5.013	1.392	0.992
Age	19.665	2.864	19.216	2.620	0.051
Number of Years at College	1.567	0.793	1.597	0.840	0.655

Note: ** Significant at the 0.001 level; * significant at the 0.05 level.

Table 2. Descriptive Statistics and Mean Values between the Two Genders

Construct (Cronbach's Alpha)	Item	Loading	T-stats
CSE (0.912)	CSE1: I enjoy using computers.	0.923	138.493
	CSE2: I am confident about using computers.	0.926	116.189
	CSE3: In general, I am comfortable with using computers and software applications.	0.910	89.957
FC (0.892)	FC1: I have the resources necessary to assist my learning in this class.	0.899	85.254
	FC2: Peer TAs and instructors are available for assistance.	0.904	102.671
	FC3: I can get enough technical support on accessing the software and/or hardware I need in order to learn this class.	0.917	119.370
IC (0.911)	IC1: The instructor is enthusiastic about teaching the class.	0.923	92.256
	IC2: The instructor is friendly towards individual students.	0.924	104.478
	IC3: The instructor is active in teaching the course subjects.	0.918	96.466
PA (0.954)	PA1: My knowledge gained in this class gives me a feeling of accomplishment.	0.973	442.968
	PA2: My knowledge gained in this class gives me a feeling of achievement.	0.969	359.142
	PA3: My knowledge gained in this class can contribute to my professional development.	0.928	132.629
PE (0.921)	PE1: This class is: disgusting/enjoyable	0.944	209.009
	PE2: This class is: unpleasant/pleasant	0.944	166.900
	PE3: This class is: boring/interesting	0.900	125.810
SAT (0.949)	SAT1: Overall, taking this class makes me feel: very dissatisfied/very satisfied	0.951	237.391
	SAT2: Overall, taking this class makes me feel: very displeased/very pleased	0.971	453.994
	SAT3: Overall, taking this class makes me feel: very terrible/very delighted	0.935	190.731

Note: CSE – computer self-efficacy, FC – facilitating conditions, IC – instructor characteristics, PA – perceived accomplishment; PE – perceived enjoyment, SAT – satisfaction.

Table 3. Reliability Test Results

Construct	Composite Reliability	AVE	CSE	FC	IC	PA	PE	SAT
CSE	0.943	0.846	**0.920**					
FC	0.933	0.822	0.352	**0.907**				
IC	0.944	0.850	0.331	0.587	**0.922**			
PA	0.970	0.916	0.350	0.712	0.553	**0.957**		
PE	0.950	0.864	0.260	0.420	0.420	0.631	**0.930**	
SAT	0.967	0.907	0.269	0.483	0.437	0.688	0.850	**0.952**

Note: Diagonal elements in bold case are the square root of average variance extracted (AVE) by constructs from their indicators; off-diagonal elements are correlations among constructs.

Table 4. Validity Test Results

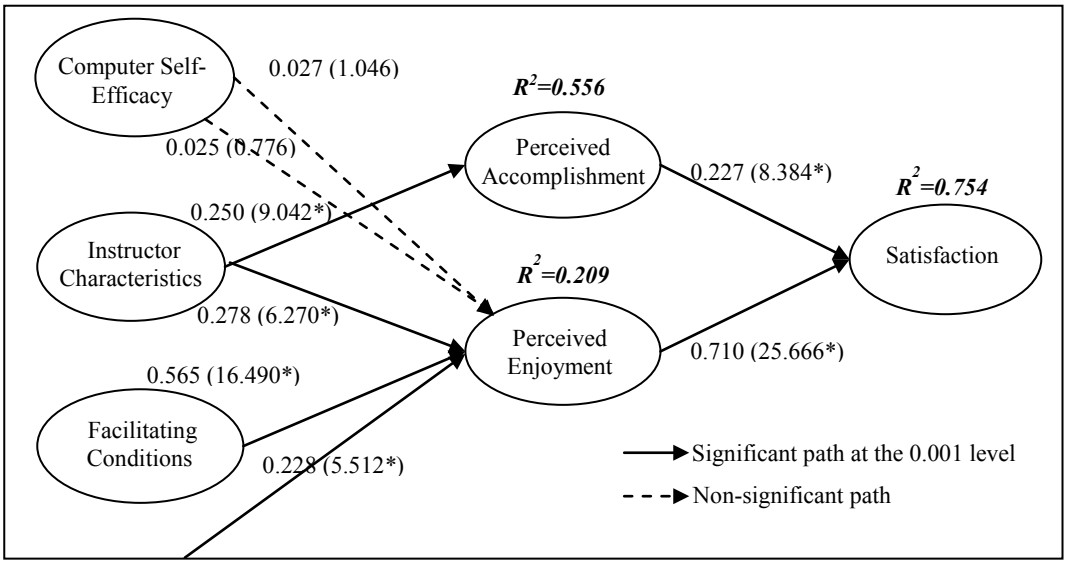

Figure 1. Model Test Results for Males (N = 263)

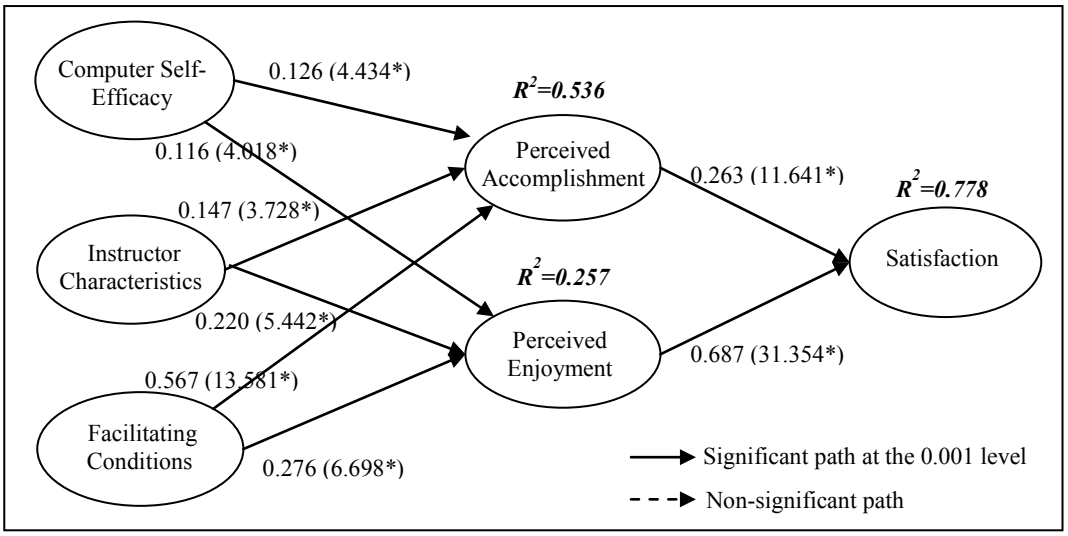

Figure 2. Model Test Results for Females (N = 320)

For female students, the results showed that computer self-efficacy could significantly influence both their perceived accomplishment (path coefficient = 0.126, t = 4.434) and perceived enjoyment (path coefficient = 0.116, t = 4.018). Therefore, H1a and H1b were supported. Similar to what we found on male students, both H2a and H2b were supported (path coefficient = 0.147, t = 3.728; path coefficient = 0.220, t = 5.442); both H3a and H3b were supported (path coefficient = 0.567, t = 13.581; path coefficient = 0.276, t = 6.698). In addition, H4 and H5 also were supported on females (path coefficient = 0.263, t = 11.641; path coefficient = 0.687, t = 31.354). The R-squared values associated with perceived accomplishment and perceived enjoyment are 0.536 and 0.257, respectively. The R-squared value for satisfaction is 0.778.

By comparing the model testing results between the two genders, an interesting gender difference was found in terms of the impacts of computer self-efficacy on perceived accomplishment and enjoyment. These impacts were found to be significant for female students, but not for their male counterparts. More discussions on this are provided in the next section.

5. DISCUSSION

Understanding the adoption of the blended learning environment is important for higher education in the modern age. Along that line, this research has made several contributions to existing literature on blended learning and education in general. First, this research systematically and empirically examined the impacts of various factors from different perspectives (including students themselves, instructors, and institutional support) on student learning. Specifically, a research model was development to assess the impacts of students' computer self-efficacy, instructor characteristics, and facilitating conditions on their perceived accomplishment and enjoyment, as well as satisfaction, toward the blended class. The data analysis results showed

that computer self-efficacy (for female students only), instructor characteristics (for both genders), and facilitating conditions (for both genders) had significant impacts on both students' perceived accomplishment and enjoyment, which in turn significantly influenced their satisfaction toward the blended learning environment.

Another contribution made by this study is the identification of an interesting gender difference from the proposed research model. By testing the model on male and female students separately, we found a considerable gender difference on the impacts of students' computer self-efficacy on their perceived accomplishment and enjoyment. Specifically, both impacts were statistically significant for females, but not for males. For all other causal paths proposed in the model, their magnitudes of significance were quite similar between males and females. In addition, the computer self-efficacy mean value for males was higher than that for females, and the difference was statistically significant (see Table 2). This result is interesting, and indicates that although males tended to have a higher level of perception of their computer self-efficacy, such perception didn't seem to lead to an increased feeling of perceived accomplishment or enjoyment of the blended class. On the contrary, although females rated their computer self-efficacy not as high as males did, their perception of computer self-efficacy significantly and positively influenced their perceived accomplishment and enjoyment of the blended class.

Our finding of male students demonstrating higher computer self-efficacy than female students is consistent with what has been found in previous literature (Ballou and Huguenard, 2008; Beyer, 2008; He and Freeman, 2010; Karsten and Schmidt, 2008). For example, by conducting a longitudinal study with a ten-year time span, Karsten and Schmidt (2008) found that male students' computer self-efficacy was significantly higher than that of female students over years. However, the lower level of computer self-efficacy doesn't seem to negatively impact female students' learning attitude or outcome; rather, it serves as a positive motivation in their learning (Ballou and Huguenard, 2008). As found by Ballou and Huguenard (2008), female students could overcome their initial disadvantages in computer self-efficacy and usage experience through a strong commitment in learning, thus leading to the same level or even better performance than male students. Consistently, Beyer (2008) found that female students' computer self-efficacy were lower than males', but with more positive attitudes toward their IS courses and instructors.

We also hope the results of this study can bring some insights to educators who are interested in teaching blended classes. As shown in the analysis results, students' (no matter males or females) perceived accomplishment and enjoyment toward the blended class could significantly influence their learning satisfaction. Because of the reduced face-to-face class meeting time and increased use of online systems and other related technologies, it is common to expect that students need to take more effort to get familiar with and make effective use of the blended learning environment. Therefore, to help keep them interested in learning, educators should put more effort in checking and making sure that students enjoy the learning environment and have the sense of accomplishment in their learning.

Based on the research findings of this study, educators need to be aware of the influential power of their own characteristics and try to improve them, as well as make sure there is enough effective support to students' learning. For example, it is important for instructors to be enthusiastic, friendly, and active in teaching. Students won't like the class and the subject to learn unless they find that their instructors like it and are approachable when they need help. Enough and effective support (both technical and pedagogical) also plays an important role in influencing student learning in the blended environment. Since the whole idea of blended learning is to provide learner-centric education, providing students with the support they need and in a timely manner can help them make the best use of this learning environment.

The results concerning computer self-efficacy also have several implications for educators' implications. For female students, since their computer self-efficacy significantly and positively influenced their perceptions toward accomplishment and enjoyment in learning, it is important for educators to help them build their self-efficacy. For example, educators can provide step-by-step practices to them and give them constructive feedbacks and comments on their gradual improvement over the semester. For male students, such impact doesn't seem to exist. However, as argued by previous literature, one possible reason could be that they were over-confident about their computer knowledge and ability, thus leading to less commitment and lower effort in learning. In that case, it is important for educators to keep this issue in mind, and try to encourage them to work hard and value students (especially males) based on their commitment and hard work instead of their computer proficiency.

This study also has some limitations that future research can further improve. First, we only tested the proposed research model on freshmen and sophomores. They are a group of students who are new to college education and may need more guidance in their study. To further validate the research model, future research can test it for juniors and seniors (when blended classes are available for these students), and compare whether there is any difference between the two groups in terms of adapting to the blended learning environment. Second, this study focuses only on the blended learning instructional method. To gain an in-depth understanding of the advantages and disadvantages associated with different ways of instruction, future research could empirically assess and compare student learning across face-to-face, e-learning, and blended learning. When possible, an experiment can be conducted by adopting the three ways of instruction in three different sections of the same class, and then compare students' performance by controlling other factors. Third, because the females in this study had statistically significant lower computer self-efficacy (CSE), there might exist the possibility that the differences observed in outcome measures were a function of CSE rather than gender itself. Future research could further verify this by testing the research model using two data sets based on a median split of CSE instead of the gender split used in the current study. In addition, the number of constructs in the research model can be broadened beyond the factors of computer self-efficacy, instructor characteristics, and facilitating conditions.

6. CONCLUSION

This study developed a research model to systematically and empirically investigate influencing factors on students' learning in the blended learning environment from different perspectives, including students themselves, instructors, and institutional support. Specifically, factors of students' computer self-efficacy, instructor characteristics, and facilitating conditions were included, and their impacts on students' perceived accomplishment, perceived enjoyment, and satisfaction were examined. The data analysis results showed that, for males, both instructor characteristics and facilitating conditions could significantly influence their perceived accomplishment and enjoyment, which in turn impacted their satisfaction toward the blended class. For females, all three factors significantly associated with perceived accomplishment and enjoyment, which then influenced their satisfaction. By comparing the model testing results on the two genders, an interesting gender difference was found. That is, computer self-efficacy could significantly influence female students' perceived accomplishment and enjoyment, but no such impact was found for male students. Detailed discussions on the research results and the identified gender difference were provided in this study. Overall, we believe this research contributes to the literature on blended learning as well as higher education in general.

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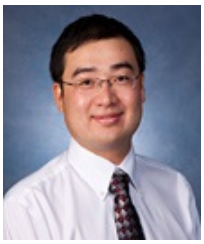

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ISSN 1055-3096