

UNIVERSITY STUDENTS' ONLINE INTERACTIONS AND THEIR ATTITUDE CHANGES TOWARD ONLINE LEARNING IN A BLENDED COURSE

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Abstract:

The present paper examines the relationship between a group of tertiary students' learning experiences of online interactions and their attitudes toward online learning in a blended course. Ninety-four students, who were enrolled in a blended course of "Using ICT in Education" in a university in Australia, participated in the research project. The participants completed a pre and posttest about their attitudes toward online learning at the beginning and the end of the course. Moreover, they were requested to complete weekly reports about their course experiences for six weeks. By the end of the course, the students with marked changes in their online learning attitudes participated in an interview and provided more detailed information about their experiences of online interactions. It was found that the students displaying more positive changes in their online learning attitudes reported to be more actively involved in online discussion and more positive experiences of interacting with their peers and teachers online. In contrast, the students without such positive changes in online learning attitudes commented on several issues in online interactions, such as teachers' moderation, peer support, course assessment design, and motivation to use online forum. It is suggested that more consideration about pedagogical design and students' individual differences in learning need to be taken when educators develop blended courses, especially integrating online forum in tertiary education.

Introduction

Over the past decades, there has been an increased focus on university students' engagement in blended learning (Regier, 2014). Blended learning provide students with flexible access to online course content, increases their interaction with teachers and other peers. Meanwhile, face-to-face instructional sessions have been remained to provide immediacy of teachers' responses and peer interaction (Dziuban, Graham, & Picciano, 2013). Blended mode of learning combines the best of online and face-to-face learning and meet students' diverse needs and multiple commitments (Graham, 2006; Lei, 2010). However, learning in a blended environment can be challenging, in terms of requirements on students' engagement in online courses, teachers' support and peer interaction during online learning (Boyle, Bradley, Chalk, Jones, & Pickard, 2003).

Students' interactions with different aspects of online learning were found to be related to their attitudes' toward online learning. Students' online learning occurs through their online interactions with course content, interface, teachers and other students (Arbaugh, 2001; Huang, 2002; Lee, Srinivasan, Trail, Lewis, & Lopez, 2011; Lim, Morris, & Yoon, 2006; Paechter, Maier, & Macher, 2010; Russo & Benson, 2005; Thurmond & Wambach, 2004;). It has been commonly accepted that students' positive experiences in the above online interactions might contribute to their positive attitudes toward online learning.

However, non-significant or negative relationships were identified in regards to the relationships between students' online interactions and their online learning attitudes (Arbaugh & Rau, 2007; Gunawardena, Linder-VanBerschoot, LaPointe, & Rao, 2010). The following sections provides a review on the existing literature on the relationships between students' experiences of online interactions and online learning attitudes.

Students' online interactions and attitudes in an online learning environment

Student-content interactions during online learning

It was found that students' interactions with online course content were mainly indicated by their self-reported experiences of learning from the course content. Some important factors were addressed as (a) the frequency of learning from online course content (Anderson, 2003; Marks, Sibley, & Arbaugh, 2005; Thurmond & Wambach, 2004); (b) satisfaction with the course content design (e.g., syllabi, lectures, handouts, and reading materials) (Abramov & Martkovich, 2002; Hara & Kling, 2000; Hughes & Daykin, 2002; Paechter et al., 2010); and (c) course requirements (e.g., assignments, online forum questions, and learning objectives) (Abramov & Martkovich, 2002; Choy, McNickle, & Clayton, 2003; McAlister, Rivera, & Hallam, 2001). It is assumed that increased and continuous interactions with online course content may contribute to the enhancement in students' learning and increase in their course satisfaction (Thurmond & Wambach, 2004).

Student-interface interactions during online learning

It is commonly assumed that students' positive experiences of technology may contribute to positive attitudes in online learning. The aspects of technology use were found to include course flexibility (Arbaugh & Benbunan-Fich, 2007), professional design of course website (Cashion & Palmieri, 2003a, 2003b; Kettanurak et al., 2001), easiness of usage (Drennan, Kennedy, & Pesarski, 2005; Shank & Sitze, 2004), technical support (Lee et al., 2011), and level of interactivity (Kettanurak et al., 2001).

However, a non-significant predictive relationship between students' experiences of using online technologies and satisfaction in learning was reported by Arbaugh and Rau (2007). The researchers found a non-significant impact of student perceptions of using online forum on their satisfaction in a blended learning environment. The researchers argued that, although online courses could be enhanced by various delivery medium (e.g., audio, video, and multimedia), it required more technology skills for both students and teachers to work properly. Additionally, the teachers with rich ICT experiences might post too much media, which, however, did not add value to the students' learning experiences, but might create a sense of information overload.

Student-teacher online interactions

It appears that high levels of student-teacher online interactions may possibly contribute to students' positive attitudes in online learning. For example, students' positive attitudes in an online courses can be affected by teachers' strong expertise in online teaching (Anderson, Rourke, Garrison, & Archer, 2001; Lee et al., 2011; Paechter et al., 2010; Shank & Sitze, 2004; Russo & Benson, 2005; Tu & Corry, 2003), frequent and timely responses from teachers online (Ali & Elfessi, 2004; Arbaugh, 2001; Kurtz, Sagee, & Getz-Lengerman, 2003; Russo & Benson, 2005), teachers' support and facilitation in online peer interaction (Choy et al., 2003; Wu & Hiltz, 2004).

However, Arbaugh and Rau (2007) found a non-significant predictive effect of student-teacher interactions on 575 university students' satisfaction in seven blended courses. The student-teacher interactions were indicated by the students' self-report about whether the teachers frequently asked questions, offered opinions, and motivated the students' courses engagement. The correlation analysis showed that student-teacher interactions were significantly related to the students' course satisfaction ($r = .32$). But when tested in hierarchical regression model, it was found that the prediction of student-teacher interactions on the students' satisfaction was not significant.

Peer online interactions

The research concerning online peer interactions mainly focused on students' self-reported experiences, e.g., frequency of peer interactions (Brooks, 2003; Swan, Shea, Fredericksen, Pickett, & Pelz, 2000; Swan, 2001; Woods & Baker, 2004), relationship with other students (Arbaugh, 2001; Russo & Benson, 2005), feeling of isolation (Herrington, Oliver, & Reeves, 2003), willingness to interact with other students (Huang; 2002), peer support (Lee et al., 2011), and group work (McAlister

et al., 2001). It appears that the students with higher levels of peer interactions may show more positive attitudes in online learning.

However, Gunawardena et al. (2010) found a significant negative relationship between peer online interactions and students' course satisfaction. The result indicated that less peer online interactions enhanced the students' overall satisfaction. The researchers discussed that this might be due to insufficient information about the value placed on peer interactions and limited guidance on how to interact with other students online and. Gunawardena et al. also suggested the negative relationship might also be the result of the fact that online learners tended to be more self-directed and therefore might prefer a high level of independence during learning.

The similar negative relationship between peer online interactions and students' satisfaction was also reported by Arbaugh and Rau (2007). Arbaugh and Rau found that, the more peer interactions that the students had, the less satisfied they were with the online learning environment. The researchers argued whether online faculty at the graduate level needed to emphasize a high level of peer interactions, as requirement of peer interactions in an online course needed to be suitable for the course level. It appears that there is a need to further investigate how different types of online interactions can benefit students' learning.

It may be insufficient to merely measure the frequency of students' online interactions, as the quality of interactions may possibly be more critical than the quantity (Lei, 2010; Lei & Zhao, 2007). Further research needs to examine students' experiences of different types of online interactions in more depth and how such experiences can contribute to their online learning attitudes. Meanwhile research can use diverse instruments to gauge students' interactions, such as students' weekly diaries, record of logging on the course website, or online discussion contributions.

Students' online learning attitude changes

There has been an increasing interest for researchers to investigate whether online or blended learning experiences can bring changes to students' attitudes toward online learning. Agarwal and Day (1998) found the mixed results about the students' attitude changes toward the subject after using the Internet among two groups of students (i.e., graduate and undergraduate groups). It was found that the graduate became more positive toward the subject after using the Internet. However, no significant attitude change was identified among the undergraduate students.

Jung, Choi, Lim, and Leem (2002) found that taking an online course led the students to view online learning in a more positive way, regardless of what types of interactions that the students experienced. However, the reasons for the students' attitude changes were not explained. Similarly, positive changes in students' online learning attitude have been reported by Knowles and Kerkman (2007) and Sander and Morrison-Shetlar (2001), but further investigation is needed on the reasons for the students' attitude changes.

Zheng, Young, Brewer, and Wagner (2009) found that the students' experience of using the virtual tour contributed to the increases in their attitudes, but such effect lacked statistical significance. The similar issue was identified in the study by Kabilan, Ahmad, and Abidin (2010). The researchers found that the students' experiences of using Facebook enhanced their motivation in learning. However, the influence of using Facebook on the students' motivation lacked statistical analysis.

In sum, it is worthwhile to examine which factors may influence students' attitudes toward online learning. More importantly, more research is needed to examine how students' online learning experiences can contribute to their changes in their online attitudes.

Research methodology

Overview of the research design

The present research was carried out among 94 Australian university students who were enrolled in a blended course. The research aimed to investigate which factors during students' online interactions might influence their online learning attitudes in a blended environment. The research consisted of two phases: Phase One — questionnaire surveys including pretest at the beginning (Time One – T1) and posttest at the end of the course (Time Two – T2), weekly reports, and online forum contributions; and Phase Two — interviews. The design of Phase One aimed to examine (a) whether there would be any significant differences in the participants' attitudes toward online learning; (b) which factors in the pretest and the participants' weekly reports and online forum contributions would influence their attitudes toward online learning in the posttest (T2). The purpose of Phase Two was to find any potential factors during online interactions which might influence the participants' online learning attitude changes after taking the blended course.

Phase One

Participants

The participants in Phase One were 94 second-year pre-service teacher education students, who took a blended course "Information and Communication Technologies (ICTs) in Learning and Teaching". This course had a 12-week duration and aimed to provide students with theories, research, and practices on using ICTs in learning and teaching. The course blended face-to-face instruction (one-hour lecture and two-hour tutorial every week on campus) and online learning mode (online course content, online forum, communication through email and application of the Internet technologies to complete course assessments). The participants were divided into seven groups to attend tutorials and participated in online forum run by three teachers.

Procedure

The participants completed the pretest in the tutorial during the second week of the semester (at T1). They were given the access (URL) to the online pretest questionnaire. The posttest took place during the tutorial in the second last week of the semester. The URL to the questionnaire was provided to the participants to complete the survey online.

Regarding the weekly report, the participants received short questionnaires through email for six weeks and were asked to complete and send back the reports to the researcher. Seventy-four out of 94 students' responses to the weekly reports were used. In addition, by the end of the course, the researcher downloaded the transcripts of all participants' online forums posts and the data of the transcripts were recoded as the variables for further analysis.

Instruments

Pre- and post-test

The pretest questionnaire contained two sections: (a) background information; (b) attitudes toward online learning. The participants were asked to provide demographic information including name, email address, gender, age range, educational level, and language background. By keeping the records of the participants' names, their answers in the pretest could be matched with those from the posttest, weekly reports, and online forum contributions.

The questions about the participants' attitudes toward online learning in general in the present study were adopted from several existing scales (Knowles & Kerkman, 2007; Robinson & Doverspike, 2006; Yudko, Hirokawa, & Chi, 2008). The instruments about attitudes toward online learning in the present study addressed the participants' affective perception (likeness, interest, comfort, usefulness, confidence, anxiety, and perceived difficulty level), judgments, beliefs, and intention for future online learning.

The posttest questionnaire comprised of three sections: a) the participants' names, (b) attitudes toward online learning; and (c) perceived online interactions. The items of Section (a) and (b) were kept

similar with the pretest, so that the participants' attitudes toward online learning can be compared between the two occasions of T1 and T2.

In Section C, the participants were asked to provide their perception of four types of online interactions (e.g., students' interactions with online course content, course interface, teachers and peers). A five-point scale were applied to identify the students' perceptions about their experiences of online interactions. The students rated their agreement on the importance level of online interactions during their learning process from "1 = less important" to "5 = extremely important". Moreover, some items about students' sense of online community were used to examine the participants' perceived connectedness with their peers during online peer interaction.

Weekly report

The questions in the weekly report measured the participants' learning experiences, in terms of the number of hours they spent online, perceived stress level, and perceptions of their course experiences. The available figures were averaged by the number of the weekly reports submitted by the participants across six weeks to obtain a weekly average figure for each participant. For the purpose of analysis, the participants' answers about the stress level were coded from "1 = Not at all" to "5 = Very stressful". The participants' names were requested in the weekly reports, so that their answers in the weekly reports could be tracked and analyzed with those in pre- and posttest.

Online forum contribution

Over the period of 12 weeks in the course, the teachers posted questions on each tutorial group's online forum every week and students were required to post their answers onto the online forums. Additionally, students were also encouraged to raise questions or comment on their group members' posts.

Protocols from the forum groups were assessed in terms of six specific criteria. These criteria were analyzed as the variables of the participants' online forum contributions:

- (a) Online contribution frequency (the total number of the posts sent by the participants to the online forums during 12 weeks);
- (b) Online contribution length (the aggregated words of the participants' posts during 12 weeks);
- (c) Latency (how many weeks out of 12 weeks that the participants responded to the forum questions within 2 days);
- (d) Chances for interactions (how many times the participants interacted with their tutorial group members);

Data analysis

There were both quantitative and qualitative analyses in Phase One. The quantitative analyses on the data from the pre- and posttest questionnaires, weekly reports, and online forum contributions was performed on SPSS and Smart PLS. Factor analyses were conducted to test the internal consistency of online learning attitudes. The Alpha level was set at 0.05 for the purpose of the significance level in the present study.

Phase two

The interviews, which were conducted in Phase Two, aimed to obtain more in-depth information about the participants' experiences of four types of online interactions. The interview results may provide some possible clues for the changes in their online learning attitudes. The participants' answers were analyzed by the method of coding and themes, which were presented by frequencies.

Participants

Eight participants took part in the interviews. Four of them showed high level of increases and another

four did not present such increases in their attitudes toward online learning. Therefore, they were divided into two groups — Positive Change Group (PCG) and Contrast Group (CG).

Procedure

The participants were informed about the aim of the interview and the interview would take half an hour and be recorded. Six participated in face-to-face interviews and another two took part in telephone interviews. The face-to-face interviews were carried out in a quiet office. The telephone interviews took place in the same office through the use of external speaker.

Instruments

The interview questions attempted to address the participants’ course experiences through four types of interactions in the course: (a) student-content interactions; (b) student-interface interactions (i.e., the participants’ experiences of using various online learning components); (c) student-teacher interactions (teachers’ online support for students’ learning and moderation on online forum contributions); and (d) peer interactions. The participants were asked whether there was anything they “liked, enjoyed, or valued” and “did not like, enjoy, or value” about their experiences of online interactions. They were also encouraged to recalled any issues they encountered during online learning.

Data analysis

The themes of the interviewees’ statements were generated and described by coding the text data, developing a description, defining the main themes from the data, and connecting and comparing the themes between PCG and CG. The themes generated from the answers by PCG and CG participants were listed and compared by frequency tables.

Results

Demographic information

Among the 94 participants, there were 12 male and 82 female students enrolled in the course. The majority (66%) were among the age group of 15 to 20 years old, 18% were between 21 and 25 years old, 7% were from 26 to 30 years old, 2% were from 31 to 35 years old, and 7% were 36 or above.

Regarding the educational level, 94% of the participants were studying toward Bachelor degree, and 6% had already obtained Bachelor degree. Ninety-seven percent in the sample group were native English speakers and the rest were from non-English speaking background.

The participants’ online learning attitude changes

Initial online learning attitudes were measured through 17 items. A principal component analysis indicated the operation of a single factor. Reliability analysis indicated a Cronbach Alpha of .92 and AVE of .59 with 10 items contributing. It has been found that the participants’ online learning attitudes changed in a positive direction at a significant level from T1 to T2.

Table 1

Paired Samples T-test: Comparison of the Attitudes between T1 and T2

	Possible maximum	Mean (SD) T1	Mean (SD) T2	<i>t</i>	<i>Sig.</i> (2-tailed)	Effect size
Online learning attitudes	24	33.03 (4.4)	34.83 (4.8)	4.10	.000**	0.63

Note. (a) *n* = 94, (b) The figures in this table represent the means with deviation in parentheses, (c) Effect sizes were calculated on the basis of Cohen’s (1977) procedure for means testing on correlated samples (repeated measures).

Construct development for other factors

Factor analyses were conducted to test the internal consistency of several constructs, such as (a) online forum participation and (b) the participants' perceived online interactions.

The participants' online forum participation

All variables of 74 participants' weekly reports and online forum contributions were tested by Pearson correlation first. The results from the weekly reports were labelled as a) total number of the weekly reports submitted; (b) average report length; (c) hours spent online; and (d) stress level. The variables of the participants' online forum contributions included (a) online contribution frequency; (b) online contribution length; (c) latency; and (d) chances for interactions. It was found that there were significant relationships between four variables --- forum frequency, forum post length, report length, and chances for interactions (Table 2).

The above four variables were defined through using the PLS algorithm. This model has the advantage of basing calculations on standard scores prior to computation. It was found that a coherent construct – online forum participation was able to be identified, based on the following indices: online forum contribution frequency, online forum contribution length, weekly report frequency, and chances for interactions. Running the model disclosed acceptable coefficient for both average variance extraction (AVE) indices and Cronbach Alpha (AVE = .52, Cronbach Alpha = .70), with all variables' loadings contributing to the construct (Table 3).

Table 2
Correlations Between Forum Frequency, Forum Post Length And Report Length

	1	2	3	4
1. Forum frequency	–	.61**	.26*	.36**
2. Forum post length		–	.47**	.13
3. Report length			–	.36**
4. Chances for interactions				–

Note. (a) $n = 74$, (b) * $p < .05$, ** $p < .01$.

Table 3
Principal Component Loadings For The Items Tapping Online Forum participation

Item	Loading
Forum contribution frequency	.78
Online forum contribution length	.88
Weekly report length	.71
Chances for interactions	.43

Note. (a) $n = 74$, (b) Extraction methods: principal component analysis.

The participants' perceived online interactions

The variables of the participants' perceived of online interactions were examined to test the reliability and validity of the constructs of each online interaction. Table 4 indicates AVE indices and Cronbach Alpha with the number of items contributing to each online interaction.

Table 4
Cronbach Alpha For Four Types Of Online Interactions

Four types of online interactions	Number of contributing items	Cronbach Alpha	AVE
Student – course content interaction	7	.95	.78
Student – course interface interaction	10	.94	.60

Student – teacher online interaction	8	.94	.71
Peer online interaction	12	.92	.53

Note. (a) $n = 74$, (b) Extraction methods: principal component analysis.

The relationship between the participants' attitudes toward online learnings at T2 and several factors

It was found that the participants' attitudes toward online learning was significantly correlated with their online learning attitudes at T1 and perceived online peer interactions (Table 5).

Table 5
Correlations Between The Participants' Online Learning Attitudes At T2 And Other Factors

	1	2	3	4	5
1. Online learning attitudes at T2	–	.07	.17	.35**	.65**
2. Online forum participation		–	.04	-.04	.17
3. Perceived Teacher-student interaction			–	.49**	-.09
4. Received peer connection				–	.10
5. Online learning attitudes at T1					–

Note. (a) $n = 74$, (b) * $p < .05$, ** $p < .01$.

The relationship between the participants' online learning attitudes at T2 and T1 and perceived online teacher-student and peer interactions were investigated using the partial least squares approach (PLS) (Ringle, Wende, & Will, 2005) for path modelling. The initial model is shown in Figure 6.17. This figure depicts the expected relationships between the participants' online learning attitudes at T2 and the above-mentioned factors.

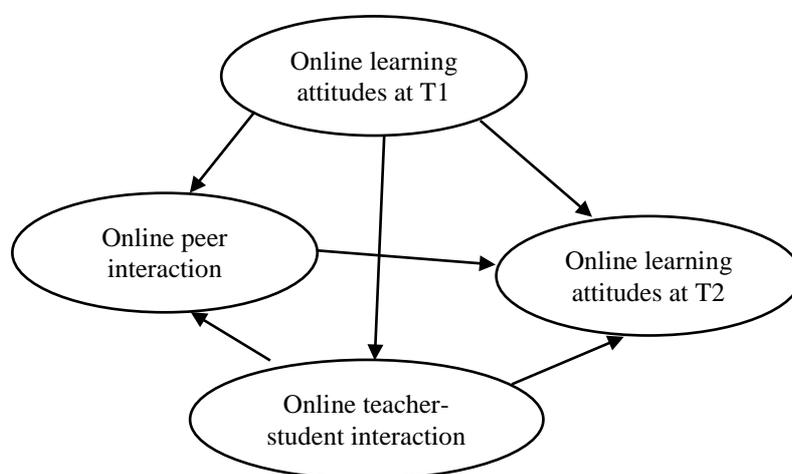


Figure 1. The initial model of the relationships between students' attitudes toward online learning at T2 and other factors

Figure 2 presents the final depiction of the significant pathways of the relationships between the participants' online learning attitudes at T2 and T1, perceived online interactions with teachers and peers, and online peer interactions. All variables were entered into analysis, consistent with Figure 1. Non-significant pathways were trimmed to produce a parsimonious and descriptive model. Fifty-one percent of the variance in the participants' attitudes toward online learning at T2 was predicted by their online learning attitudes at T1, perceived online teacher-student interactions and peer interactions ($R^2 = .51$). In the final path modelling, the participants' online learning attitudes at T1 had a direct

influence on their online learning attitudes at T2. However, the direct influence of perceived online teacher-student interactions on online learning attitudes at T2 was not significant, as the effect was mediated through perceived online peer interactions. The direct and indirect effects of perceived online teacher-student interactions on the participants' online learning attitudes at T2 accounted respectively 54% and 46% of the relationship (Table 6).

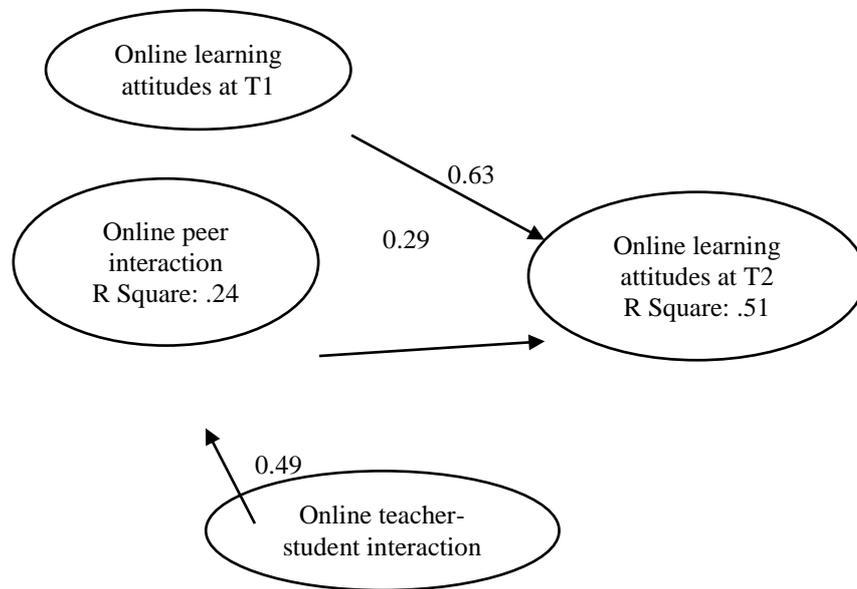


Figure 2. The final model of the relationships between students' attitudes toward online learning at T2 and other factors

Table 6
Mediation Analysis: Impact Of Online Learning Attitudes At T1 And Perceived Online Teacher-Student Interactions On Online Learning Attitudes At T2

Online learning attitudes at T1	
Total effect accounted for in the PLS model	.64
Direct effect on online learning attitudes at T2	.64
Indirect effect mediated through perceived online teacher-student interactions or peer interactions	0
Perceived online teacher-student interactions	
Total effect accounted for in the PLS model	.24
Direct effect on online learning attitudes at T2	.13 (54%)
Indirect effect mediated through perceived online peer interactions	.11 (46%)

Note. The percentage figures refer to percentage of the variance accounted for with regard to direct and indirect effects.

Results from the interviews among the participants in Positive Change Group and Contrast Group

The interview questions explored the participants' learning experiences through four types of interactions in the course (i.e., student- content, student-interface, student-teacher, and peer interactions). The following sections present the findings of PCG and CG participants' statements

about their experiences of online interactions.

The participants' interactions with the online course content

Regarding the participants' statements about their interactions with the online course content, both PCG and CG participants claimed that the course content was designed clearly with good structured. However, more PCG participants recalled that they gained knowledge from the course and felt motivated to use online resources and engaged in learning activities. On the other hand, more CG participants commented that they needed more detailed information about the course assessment and lack interest in the course (Table 7 in the Appendix).

For example, one PCG participant recalled that *"The (online) course content was clear and it is always set out neatly and easy to find out. Nothing was made difficult about it... I found the things I learned from the course interesting and valuable. It was helpful for me to use them in my future teaching"*. Another PCG participant stated that *"I liked that the course every week focused on different topics which were mainly about using ICTs. It made me be well prepared for future teaching"*.

One CG participant commented that *"There was nothing I gained from the course. I did not know what I got out of it. I had already known a lot of the knowledge shown in this course before.... Sometimes, the assignment requirements were confusing and needed to be clarified by the teacher"*. Another CG participant mentioned that *"I did not find it interesting and I was not really engaged in the course. The lectures just provided the information about ICTs, but nothing relevant to the assignments. There was nothing I liked."*

The participants' interactions with the course interface

In respect to the participants' interactions with the course interface, most of PCG and CG participants enjoyed an easy access to the course website. More PCG showed willingness to use ICT tools and online forum. In contrast, two CG participants raised an issue of lack of prior ICT experiences. Three CG participants claimed that they hadn't fully used the online forum (Table 8 in the Appendix).

For example, one PCG participant claimed that *"I gained resources through the course website and got all of the things for my assignments. I could do it on my own pace or time.... The search engines helped me get to the specific sites, rather than just 'Google'. They gave me the pathways to get to the sites I was looking for"*. One CG participant mentioned that *"I could go there anytime and print the materials out with Moodle website. I could access the course later after the lecture"*. Another PCG participant commented that *"I liked how we used the forum to answer questions weekly, because it made me think about what I have learnt"*.

Regarding the issue of lack of ICT experiences, two CG participants respectively stated that *"It was not my favourite subject area and those tools were just not a huge importance for me. A few of us knew little about ICTs and did not know how to do it. It was frustrating."* and *"I preferred making crafts on hands than just sitting there in front of a computer."*

The participants' online interactions with their teachers

As shown in Table 10 (in the Appendix), more PCG participants agreed that they received timely and helpful responses from their teachers through email. One PCG participant claimed that *"I liked that I could always bring up questions at any time of the day or whenever I was at home doing homework (e.g., late at night)"*. One CG participant stated that *"It really made me feel good that I could get the timely reply when I studied at home and was stuck in some part of the assignment."*

Regarding teachers' encouragement on the participants' online forum contribution, two PCG participants commented that they received support and encouragement from their teachers to be actively involved in online discussion (*"My teacher was good at encouraging us to express ourselves and contribute more to the forum."*).

However, one CG participant needed more teacher's moderation on the participants' online discussion (*"The teacher did not respond to the online forum, otherwise he would have known what was happening on the forum."*).

Online peer interactions

In regards to the participants' online interactions with their peers, more PCG participants reported positive experiences of using online forum than CG participants, in terms of timeliness and frequency of online communication and support from peers (Table 10 in the Appendix).

For instance, two PCG participants claimed that *"I always got help from them, because lots of people got access to university online and everyone in my tutorial group wanted to help each other."* and *"I always posted questions on the online forum. On the forum, we could talk to each other and ask questions. We always used the forum to exchange our idea."* However, two CG participants recalled that *"It supposed to be a forum for discussion, but people just posted their opinions. We saw few people responding to others' posts."* and *"We did not want to put up thing on there like 'We do not understand it'. I considered that we were marked on there (the online forum). We did not want to sound silly in front of the teacher."* Another issue raised by one CG participant that he preferred to use Facebook rather than the course online forum, as he felt more comfortable with Facebook where he was not supervised by his teacher (*"It was really handy. I always went to Facebook and checked on there. I feel free to speak there and can ask any question as I like."*).

Discussion and suggestion

It was found that there was a significant increase in the participants' attitudes toward online learning by the end of the blended course. These participants' attitudes toward online learning by the end of the course were significantly predicted by their prior online learning attitudes and the perceived online interactions with their teachers and peers. The influence of the participants' perceived online interactions with their teachers on their online learning attitudes at T2 was mediated through their perceived online peer interactions. As shown from the interview results, compared with the CG participants, the participants from the PCG showed more interest in the subject area, reported higher levels of course participation and knowledge acquisition, revealed higher levels of satisfaction with the interactions with their teachers and peers.

It has been found that an online or blended learning environment exposes students to the activities involving the usage of different online learning components, which not only contributes to the increase in the students' confidence in using technologies (Billings, Connors, & Skiba, 2001; Kenny, 2002), but also improves their course satisfaction (Hillman, 1999; McDonald & Gibson, 1998; Salmon, 1999) and online learning attitudes (López-Pérez et al., 2011).

The influence of the participants' prior online learning attitudes on their online learning attitude by the end of the course was consistent with the study by Wang, Kanfer, Hinn, and Arvan (2001). They found that the students' prior technology attitudes continued to affect their attitude toward technology. The researchers suggested that the students' prior attitudes toward technology might also influence their selection of future course which involved technology usage.

The relationship between perceived knowledge gains and students' attitudes was also reported by Swan et al. (2000) that there were significant differences in the students' course satisfaction among the students with different levels of perceived learning in the online courses. Similarly, Conrad and Donaldson (2004) also suggested that the acquisition of knowledge was critical for students' success in an online learning environment.

Meanwhile, teachers' involvement in online interactions with students can be a critical factor to mould students' positive attitudes toward online learning. More importantly, teachers' moderation on students' online peer interaction (e.g., online forum) can encourage students' engagement in online communication with other students and help to develop students' sense of online community. Beffa-Negrini et al. (2002) found that online peer interactions strongly predicted students' course satisfaction.

Similarly, Fulford and Zhang (1993) found a significant relationship between peer interactions and students' satisfaction in an online course.

Swan (2001) found that the students, who reported higher levels of online interactions with their teachers, were more engaged in learning and satisfied with the course than those with lower levels of interactions with the teachers. More recently, Asterhan and Schwarz (2010) found that, in their research, 68% of the students indicated that the teachers' moderation was important for online discussion. The reasons for the students' favour in their teachers' moderation were reported as (a) keeping the students on tasks (e.g., supervising the activities and helping the students who were unable to manage the activities themselves); (b) scaffolding critical thinking and knowledge construction; and (c) guiding the collaboration.

Nevertheless, teachers ought to moderate online discussion with careful consideration, as some students may feel reluctant to post their contribution when they are supervised by teachers. The usage of Facebook reported by one CG participant in the present study was in accordance with the findings by Wood, Barnes, Vivian, Scutter, and Stokes-Thompson (2010) and Vivian and Barnes (2010). They found that 91% of the students were active users of Facebook (Wood et al., 2010; Vivian & Barnes, 2010). Facebook was found to be easy to use and facilitated students' learning through building a comfortable learning community (Mazman & Usluel, 2010).

Furthermore, in Vivian's (2011) research, the students claimed that the benefits brought by Facebook to their learning outweighed the issue of distraction. The benefits reported by the students included (a) being affordable; (b) habitual; (c) usefulness and easy features; (d) availability; (e) accessibility; and (f) support for building the social network.

Considering the above-mentioned issue about teachers' moderation in online discussion, teachers ought to design online discussion with consideration of students' learning preference and the nature of online forum tasks. Feeling being monitored in online discussion may reduce students' perceived self-determination (Howland & Moore, 2002). The assessment of students' online discussion needs a balance between task-oriented and self-directed approaches (Xie, 2006). Thomas (2002) has suggested that the students' online discussion could be evaluated both quantitatively and qualitatively when their online discussion was linked with the course assessment.

It is worthwhile to investigate how to encourage students' online discussions without actually taking over in the process (Mazzolini & Maddison, 2007). Kearsley (2000) indicated that teachers needed to maintain a balance between too little and too much involvement. The teachers need to consider the proper time to moderate students' online discussion, such as when to make a comment, ask questions, or redirect the discussion.

When teachers moderate online discussion, their role needs to be limited to monitoring, but not intervening (Dysthe, 2002). Asterhan and Schwarz (2010) investigated 16 graduate students' participation in an online discussion. The researchers found that teachers' effective moderation included involvement, the speed of responses, being active in the discussion, keeping the discussion focused, and objectivity and neutrality. Oren, Mioduser, and Nachmias (2002) suggested that teachers' moderation skills included positive emotions, humour, encouragement and guidance for the productive direction of discussion, correcting mistakes, and promoting the exchanges between students.

Learning in a blended environment may encourage students' to be more positive toward online learning. Students' online interactions with their teachers and peers are critical for their successful learning experience. Although students' interactions with the online course content and interface were not found to influence their online learning attitudes at a statistically significant level, the findings from the interviews indicated that the participants with positive changes in their attitudes revealed more positive experiences of using online course content and interface. Careful consideration needs to be taken on the design of online forum tasks to create a comfortable environment, which can facilitate students' interactions, develop their sense of community, and enhance their learning.

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