Influence of Technology-Mediated Learning Models on Student Satisfaction Based on Self-Determination Theory

Yangxi Han (tva190013@siswa.um.edu.my)
University of Malaya, Malaysia;
North China University of Water Resources and Electric Power, China

Ng Lee Luan (ngleeluan@um.edu.my) *Correspondence Author 1
University of Malaya, Malaysia

Shuo Zhao (zhaoshuo@nwpu.edu.cn) *Correspondence Author 2
Communication University of China, China
Krik University, Thailand

Abstract

As humans may need to co-exist with the Covid-19 in the long term, course delivery in higher education is increasingly dependent on technology-mediated learning. However, research on the impact of technology-mediated learning on student satisfaction is not sufficiently addressed in academic English learning. Questionnaires were administered to 282 Chinese undergraduate students to examine their perceptions of the three instruction models (face-to-face, blended learning, and flipped learning) from six dimensions. Six semi-structured student interviews were conducted to explore their feelings toward the learning models based on the self-determination theory (SDT). Three major findings were reported. First, the technology-mediated learning environment facilitates students' needs for SDT. Second, FL learning did not significantly increase student satisfaction with BL learning. Third, besides SDT factors, students also had psychological needs to ease tension. The findings shed light on the need for future instructional designs in technology-mediated learning models in academic English learning.

Keywords: blended learning; flipped learning; student satisfaction; self-determination theory; technology-mediated learning environment

Introduction

Due to the travel restriction and epidemic prevention measures imposed by countries globally since 2020, universities and colleges are forced to transform lectures from lecture hall-based learning to online distanced learning. According to the report issued by UNESCO (2020), roughly 1 billion students experienced school closure during the global Covid-19 pandemic. The pandemic created an urgent need for technology-mediated learning due to health risks linked to physical contact. Technology-mediated learning is defined as any means of study which are facilitated by technologies and tends to serve as a supplemental form of learning. Its influence in the higher education context took on an unprecedented scale during the outbreak. For example, in China alone, 1454 Chinese universities suspended face-to-face schooling and adopted various online learning platforms between January 29 and April 3 in 2020 when the pandemic seriously hit the country (Jiang et al., 2021). There were 942,000 online courses and 7,133,000 online lecturers offered by over 950,000 lecturers during that period (Akbay et al., 2022; Jiang et al., 2021). In late 2021, as the Covid-19 epidemic eased in some areas, universities resumed campus-based learning which included technology-mediated learning in a blended way. With technological advances being used more frequently in higher education, the paradigm shift in learning models is accompanied by changes in the learning methods and processes of learners (Golonka et al., 2014; Yılmaz et al., 2021). Yet students' satisfaction with the resumed face-to-face learning, which is now heavily combined with digital learning, is not sufficiently studied. The prevailing literature is predominately focused on the discussion of student satisfaction when the pandemic first took place in 2020. As time moves on, learners have to adapt to the change in their learning process as the blended form of learning is likely to be a stable feature in most learning contexts. They may subsequently need to cope with the possible changes in their cognitive loads in their daily learning process (Cancino & Panes, 2021; Qinghua, 2021). Therefore, investigations into the influence of blended learning on learners' satisfaction (perceptions and feelings) are crucially important because students' attitudes have an impact on their behaviors (Taghizadeh & Hajhosseini, 2021). For example, it may influence how students make decisions, the use of course materials and the technological functions involved, lecturer and peer involvement, and even how learners cope with learning tasks and manage their academic time. Previous studies have indicated students' higher satisfaction in academic English learning predicts a higher motivation and more effective learning effects (Akadiri et al., 022; Yan et al., 2021). The major theoretical framework in this research is the self-determination theory (SDT). The reason for applying this rationale is that student satisfaction relates to the fulfillment of students' innate psychological needs, i.e., autonomy, competence, and relatedness (Fan & Long, 2022). For instance, the effectiveness of teaching and learning depends to a large extent on Chinese students' autonomy in higher education. As students get enrolled in a university, they are confronted with a drastic change in the learning routines that usually offers a higher level of flexibility. Simultaneously, the course of academic English increases the

learning difficulty due to a higher level of proficiency that is specific to academic English other than their native language. These challenges in tertiary learning objectively require a higher level of autonomy from students. The technology-mediated models which can effectively meet students' needs for autonomy are likely to promote a higher level of autonomy, enhance a higher level of student satisfaction and result in more effective learning. This sheds light on the significance of this research to investigate whether the technology-mediated models effectively facilitate student satisfaction based on students' perceptions and feelings.

Although several previous studies have focused on students' satisfaction with technology-mediated learning in higher education, little attention has been paid to the effect of different blended learning models on student satisfaction (Diep et al., 2017). Thus, this study aims to examine the impact of face-to-face, blended learning (BL), and flipped learning (FL) on the satisfaction of English as a foreign language (EFL) students. The research lasted for one academic term and involved two technology-mediated learning models (BL and FL) and a face-to-face model as a control group. The details of the learning processes are presented in Table 1.

Table 1

The Course Procedures in the Face-to-face Learning, Blended Learning, and Flipped Learning Model

		Face-to-face	Blended learning	Flipped learning
Preview	Model	Through textbooks	Online	Online
	Content	Preview tasks	Preview tasks	Preview tasks+the unit content
	Record	No tracking record available	Tracking record available online	Tracking record available online
Lecture	Frequency	4 classes per week	4 classes per week	4 classes per week
	Content	Lecturer delivery	Lecturer delivery	Problem-solving student discussion
		Unit content	Unit content	Activity related to the unit content (Mind maps)
	Medium	Textbooks Lecturer	Textbooks Lecturer Online learning app	Lecturer Online learning app
	Approach	Content-focused method	Content-focused method	Task-based learning Student-centered

		Lecturer-based method	Lecturer-based method	method
Review	Content	Reflection and writing exercises	Reflection and writing exercises	Reflection and writing exercises
	Model	In paper	In paper+online	Fully online

Literature review

Theoretical backgrounds

Self-determination Theory

Satisfaction in a technology-mediated learning environment is, in essence, students' feelings and opinions towards adopting technologies in their learning process (Wong, 2019). This means that students' feelings will probably be satisfied when their psychological needs are met. Their innate psychological needs mainly refer to relatedness, autonomy, and competence, as defined by the SDT theory (Deci & Ryan, 2012). Relatedness refers to a person's desire and needs to socialize with others. In the context of a technology-mediated environment, relatedness means that students have a sense of belonging to the study community with digital support. Competence is closely related to self-efficacy. This indicates students' perceptions of their ability to cope with certain tasks. Autonomy refers to one's need for self-regulation (Wong, 2019). Since this research takes a philosophical stand on social constructivism, students' innate needs are believed to interact with their outside environmental factors, such as lecturer or digital factors. The existing literature has mainly focused on SDT's impact on student-teacher interactions (Chiu, 2021). However, besides teacher support, students also require digital support, which has seldom been addressed. Chiu (2021) found that the digital support provided by the learning management system engaged students better than teacher support. Digital support enhances students' psychological needs by offering various learning resources, promoting a positive learning atmosphere, and incorporating exercises and learning materials in a cognitively manageable manner. While some existing studies have highlighted the importance of investigations on technological influence on students' satisfaction, these studies have mainly focused on the impact of individual factors on student satisfaction such as independent learning skills and anxiety on academic English learning (Fei, 2016; Geng et al., 2021). There is a lack of comprehensive consideration of the multiple factors of technology-mediated learning on student satisfaction.

Hexagonal E-learning Assessment Model and Sun et al.'s Model

With SDT measuring students' feelings, students' perceptions were measured through an adapted instrument model based on the Hexagonal E-learning Assessment Model (HELAM) and Sun et al.'s model to cover various aspects of satisfaction. (Ozkan et al., 2008; Sun et al., 2008). It suits the purpose of this research to examine the effects of possible factors of learning environments on student satisfaction. As shown in Figure 1, the new instrument for assessing students' satisfaction with TALL has six aspects: teacher, learner, course, technology, design, and environment.

Figure 1

*The Instrument to Measure Students' Perceptions Towards Technology-Mediated Learning*

Although a hexagonal e-learning assessment model was initially designed to measure the perceived satisfaction of a learning management system (LMS), the use of the model is not specific to LMS. HELAM model is deemed as one evaluation model that can be used to assess user satisfaction with a system of e-learning (Pritalia et al., 2018). The advantage being the research framework includes both social and technological dimensions. The social dimension involves the quality of the instructor and learner's perceived effectiveness, and the technology dimension includes system quality, Internet quality, content quality, and service quality. In line with the social constructivism theory, HELAM proposes that e-learning is influenced by social interactions (Ozkan & Koseler, 2009). In that case, factors such as students, faculty, institutions, and systems take influence e-learning in an integrated way. Similarly, Sun et al. (2008)'s model integrates the student dimension, instructor dimension, course dimension, technology dimension, design dimension, and environmental dimension.

The ultimate reason for measuring students' satisfaction was that their satisfaction affected their user experience. Since user satisfaction is an important indicator of teaching and learning quality and efficiency (Taghizadeh & Hajhosseini,

2021), the more satisfied learners are with their learning experience, they are more likely to be successful in their academic studies. Meanwhile, the trend of technological advances has to put priority concern on the user experience. Rather than a static state, the relationship between technology-mediated learning, learner satisfaction, and learner behaviors is a dynamic, ongoing, and interactive process. This relationship is illustrated in Figure 2.

Figure 2
Learner Satisfaction in a Technology-Mediated Environment
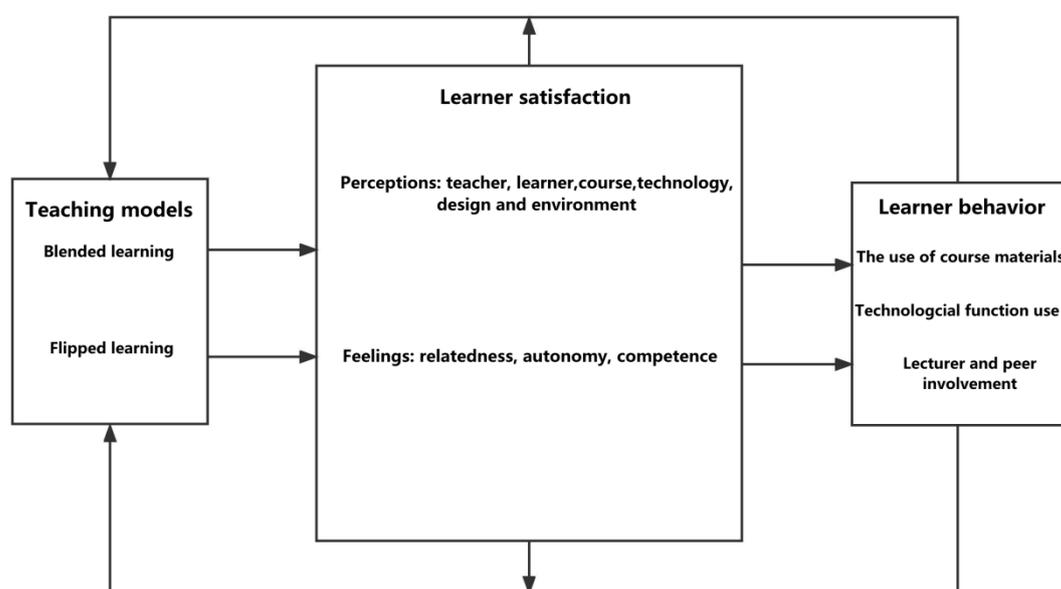
Experimental backgrounds

Satisfaction in blended learning and flipped learning

According to previous research, the effects of BL and FL on student satisfaction are inconclusive (Cheng et al., 2019). Some studies reported the adoption of BL and FL yields positive attitudes in student satisfaction (Kintu et al., 2017; Lee et al., 2017; Taghizadeh & Hajhosseini, 2021; Yuen et al., 2019). However, their studies report negative feelings such as frustration from students after adopting FL (Fisher et al., 2020). However, students' decisions are not as simple as either positive or negative. It is necessary to take a more comprehensive consideration of satisfaction. First, student satisfaction can be interwoven. Students can hold both positive and negative views of different features of the same technology platform (Fisher et al., 2020). For example, students can be satisfied with the automatic writing evaluation function while complaining about the peer review function that some students feel embarrassed about

evaluating other people's work. Second, the discussion of satisfaction on BL and FL in previous research has been confined to the discussion of its technical qualities. The BL and FL are not just a simple application of technology, but a learning environment in which the instructor, learner, technology, and environmental factors interacted in an integrated way; thus, these factors should be taken into account. Third, it is important to distinguish FL from BL. While some researchers regarded FL as just one form of blended learning, FL and BL, however, do not necessarily share the same definition. BL is defined as a combination of face-to-face and online learning (Dziuban et al., 2018). It is a broad concept that incorporates multiple types of BL models. While FL in language learning mainly refers to a learning model in which knowledge instruction is moved online before the lecture, the lecture gives more space for collaborative learning or project-based learning（Bauer-Ramazani et al., 2016）. The essential concept of FL is to flip the classroom learning content via an asynchronous pre-study before the class. Some previous studies indicated that the advantage of adopting FL is that it promotes a higher order of learning, for example, analyzing, discussing, and creative activities (Lee et al., 2017). However, the design and implementation of BL and FL entail more sophisticated considerations. It is roughly known that when the technology-mediated learning models change from BL to FL, will there be any subsequent changes in students' perceptions and feelings towards e-learning. This research, therefore, aims to fill the gap by comparing students' perceptions among the 3 research groups (Face-to-face, BL, and FL) under the frameworks of HELAM and Sun et al.'s model and exploring students' feelings in BL and FL groups based on SDT theory.

Research questions

1. To what extent does a technology-mediated learning environment (BL and FL) affect students' satisfaction?
2. How do students perceive the effects of technology-mediated learning environments (BL and FL) on their feelings towards EFL learning based on self-determination theory?

Methods

To investigate the research questions, the study used a mixed-method approach with a quantitative questionnaire complemented by semi-structured interviews. The research first compared the EFL students' satisfaction levels among the BL and FL groups with a control group that engaged solely in face-to-face learning. Online one-to-one semi-structured interviews were conducted between the BL and FL groups for the interpretative data.

Context and participants

The research was undertaken at three general polytechnic universities in Henan, central China. The English writing course is mandatory for all second-year undergraduate students. A total number of 356 students enrolled in this course shared the same course goals and materials. Five units were delivered in one academic term from September 2020 to January 2021. There were three groups: face-to-face (127 students), blended learning (108 students), and flipped learning (121 students). Each group had a lecturer who shared a similar educational background with English education or applied linguistics degrees and 10-12 years of teaching experience.

The convenience sampling method was selected to choose the target participants for the questionnaire, and the random sampling method was applied to recruit the interviewees. All participants were second-year Chinese undergraduate students majoring in engineering disciplines. The reason for selecting students in engineering disciplines was that students in these disciplines usually feel English writing is more challenging than their peers in the social sciences. All the participants shared a similar English learning experience wherein they started learning English in primary school and kept learning English as a subject until university. Their average age was 19 years, and their sex distribution was male (63.1%) and female (36.9%). We planned to recruit 100 participants for each group; however, a total of 282 students agreed to participate in this research and signed the consent forms (control, 86; blended learning, 98; FL, 98). The researchers collected their National College Entrance Examination Score (known as Gaokao), the participants had an average score of 111.5 on the English exam.

Course procedure

The writing course starts with a pre-study of the unit content, finishing the pre-tasks, and then the course goes with a classroom lecture. After the lecture, a review of reflections and exercises is required.

Data collection

After obtaining institutional consent from the deans, the researchers collected the data electronically through www.wjx.com. The response style of the satisfaction questionnaire was a five-point Likert-type scale ranging from 1 (completely disagree) to 5 (completely agree) (totally agree). The researchers used the weighted average method to score the questionnaire and assigned each sub-section (completely disagree 1, disagree 2, uncertain 3, agree 4, completely agree 5) accordingly. The questionnaire had 38 items in total, with 5 items asking about demographic information, such as gender, age, disciplines, etc. The rest 33 items were about students' perceptions of their learning experience specific to the student, instructor, course, technology, design, and environmental dimensions. The questionnaire was written in Mandarin to ensure that all items were understood by the participants. Two EFL experts reviewed the questionnaire items to check for validity. Regarding the reliability of the questionnaire, a pilot test of

47 students was conducted, and Cronbach's alpha was calculated using IBM SPSS 26. Cronbach's alpha was 0.951 and the KMO was 0.615, both of which were considered appropriate for the study. Participants accessed the questionnaire through a QR code scan. The questionnaires were sent at the end of the academic term in January 2021. Then, the researchers randomly selected six participants (BL:3 and FL:3) for the one-to-one semi-structured interviews. The interview aimed to explore the participants' feelings towards their technology-mediated learning experience in depth. Since the interview questions are guided by the self-determination theory of basic psychological needs, the questions mainly include three dimensions autonomy, competence, and relatedness. There were 10 interview questions in total. The first question asked about their general feelings towards their technological-mediated learning experience. Then the autonomy dimension includes cognitive interest, curiosity, satisfaction, and enjoyment, the competence dimension involves their study competence, learning achievements, and learning effects. The relatedness dimension refers to the student-student interaction, student-teacher interaction, and social communication related to technology-mediated learning. The interviews were conducted using WeChat. WeChat is an instant message system that provides text messaging, voice and video chatting, online payment, etc. The interview for each participant took up to 30 minutes. The interviews were conducted in Mandarin to allow participants to freely express their ideas without language barriers. During the interview process, follow-up questions such as "how" or "why" were randomly added based on the interviewees' responses.

Data analysis

The questionnaire data were analyzed using GraphPad Prism 9.0. An ANOVA test was adopted with Tukey post-hoc comparison. As for the interview data, all transcripts were transcribed verbatim through IFLYTEK Heard (https://www.iflyrec.com/) and then translated using a licensed translator. Data analysis was conducted using NVivo 12. The transcripts were analyzed through a thematic analysis approach. The reason for adopting thematic analysis is due to the research purpose for conducting the interviews. Since the interviews aim to explore students' feelings towards their technology-mediated learning experience in-depth, thematic analysis is a reasonable choice since it is good for exploring patterns across qualitative data and helps researchers understand the patterns of a phenomenon in depth.

Results

The results indicate that there are significant statistical differences between the control and technology-mediated groups. Both BL and FL groups satisfied the participants at a similar level. The results show a statistically significant difference at

the p<0.05 level in student satisfaction scores among the three groups: F (2, 282) =8.33, p=0.00. Despite the results being statistically significant, the numerical actual difference was not significant. The mean scores in the technology-enhanced groups were slightly higher than those in the control group. The effect size was 0.05, using eta squared. Post-hoc comparisons using the Tukey HSD test showed that the mean score in the control group (M=3.48, SD=0.64) was significantly different from that of the BL group (M=3.77, SD=0.64) and FL groups (M=3.85, SD=0.66). However, the BL and FL groups showed no significant difference, as illustrated in Figure 3.

Figure 3
ANOVA Test Results in Satisfaction
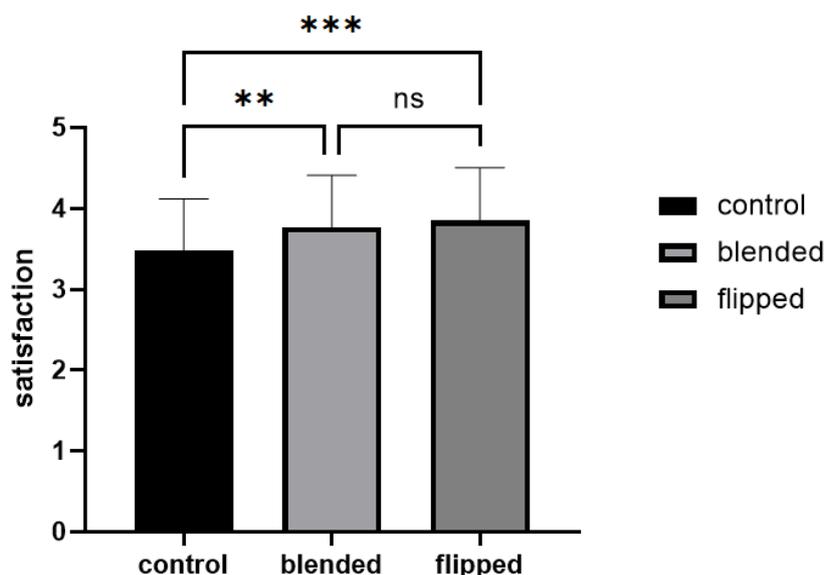
As illustrated in Figure 4, the student satisfaction means in the BL and FL groups were higher than those in the control group in every dimension. Among all the three groups, the highest mean score was in the lecturer dimension. This dimension measured whether the lecturers truly replied to students' questions through the three models and whether the student-teacher interactions were effective. The satisfaction means in the student dimension are the lowest. The questionnaire items include statements about how the three models support their self-regulated learning, to what extent they perceive the three models to meet their academic learning needs, etc. The means in the remaining dimensions remained at a similar level.

Figure 4
Student Satisfaction Means in Dimensions
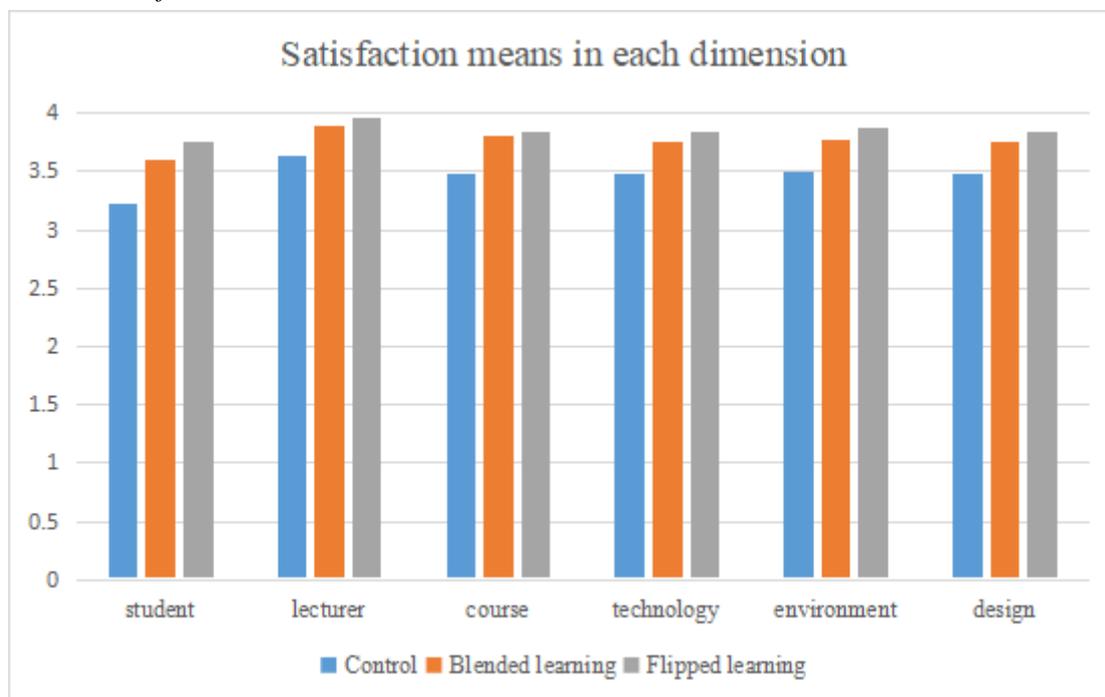
From the transcripts of the six interviewees (Figure 5), themes such as autonomy, competence, and relatedness were identified. In terms of autonomy, the majority of the interviewees expressed positive feelings towards the technology-mediated learning environment for being more self-initiating, as shown in Figure 4. They expressed feelings such as 'motivated' and 'enthusiastic' towards BL and FL for providing the opportunity to self-regulate the pace of learning and raise awareness for self-regulated learning. They were also motivated by the student-centered learning style. For example, Interviewee 1 reported that she was satisfied with supplemental online learning in the BL model because the online platforms provide detailed explanations and examples of academic writing skills. She could access them at any time at her disposal.

> *Since the teacher cannot cover everything in class, and then if I need to improve myself, I think I still need some detailed explanations on the platforms. Oh, I am satisfied with that part. (Interviewee 1).*

However, interviewee 6 expressed anxiety in the FL model due to its reliance on students' self-discipline. Since students have to finish the course knowledge learning before having group discussions or other creative activities in class, the learning style put those students who lacked self-discipline in a disadvantageous situation.

> *I found that many classmates around me, including me, sometimes just do not always follow what the teacher told us to do, not always follow the instruction in*

the online systems. As time went on, some felt frustrated and gave up completely (Interviewee 6).

Figure 5

Students' Feelings Towards the Technology-Mediated Learning Environment
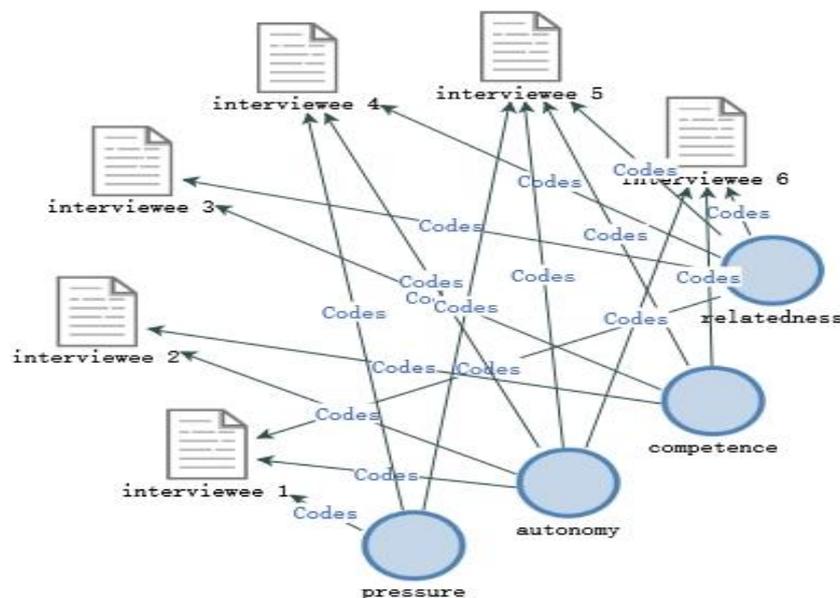
Furthermore, the theme of competence was frequently mentioned by interviewees. They reported stronger self-confidence compared to higher school times. Since they were able to increase academic knowledge, enrich their awareness, and expand their scope of thinking by engaging in the technology-mediated learning environment, they feel more confident in dealing with EFL learning. For example, interviewee 2 expressed that he felt more self-confident about communicating in English because of the frequent exposure and practice of the English language.

In high school, it was just memorizing words and then there was some fixed grammar learning, and then… Then when I got to university, I thought I had heard so much, spoken so much, and written so much. So, I am confident to speak and write more English now. (Interviewee 2)

Regarding the theme of relatedness, almost all the interviewees showed positive attitudes towards online group discussions (Figure 4). Through online group work, they felt a sense of commitment to online tasks and are easily motivated by others. Since the classmates may have different ideas about the same writing topic, students expressed their feelings using expressions such as 'interested,' 'fun doing it,' and 'enjoy sharing ideas' when having teamwork with their peers in FL.

The advantage of online group discussion over individual study is that 1000

readers may have 1000 Hamlets, and everyone can express a different point of view; students learn and discuss together. I find it fun doing this and I like this kind of learning (Interviewee 4).

For students who are introverted and may hesitate to ask questions, the technology-mediated learning environment provides them with opportunities to communicate with the lecturers online. They feel more comfortable expressing themselves online, and their voices are more frequently heard through online learning systems.

I felt more in touch with the teacher, and what the teacher said online was probably more helpful to me. I feel a bit closer to the teacher (Interviewee 1).

In addition to all the positive feelings, the theme of pressure emerged. Half of the interviewees expressed feelings of pressure when the online learning time or the number of online systems got overwhelming. They felt stressed to cope with the excessive online learning loads. They reported that the overloaded online and offline assignments made them feel exhausted, and the long-time staring at screens was likely to damage their eyes. If the design of BL and FL lost the balance in distributing time or tasks, they tended to feel frustrated to cope with them.

Don't have too much homework, you have it online, and the teacher assigns it offline; instead, it becomes a lot of pressure (Interviewee 1).

Discussion

The research findings firstly indicate that a technology-mediated learning environment can help meet students' needs for autonomy, competence, and relatedness. The finding is consistent with the previous finding that the learning environment and process can have an impact on people's core psychological demands for competence, autonomy, and relatedness (Power & Goodnough, 2018, Yazawa, 2021). Since student satisfaction is a reflection of their needs and expectations (Zhao & Yuan, 2022), the models that meet the needs of students are more likely to satisfy the students. The reason for supporting students' psychological needs is based on the theoretical point that students' psychological needs are a prerequisite for their motivation in academic English learning (Alamer & Lee, 2019). When their basic psychological needs are met, they are motivated by intrinsic factors, such as cognitive interest, curiosity, enjoyment, etc. The intrinsic motivation urges them to put more effort to study, thus a higher chance results in a more effective study. Although some research indicates that intrinsic motivation is positively related to student learning effectiveness regardless of the

learning environment (León et al., 2015), this research aims to explore the possible similarities and differences in the extent to which technology-mediated learning environments facilitate students' language learning. Since humans are not isolated from society, the learning process is perceived as a process of the constant interaction of their basic psychological needs and the social environments. The way technology-mediated learning environments facilitate students' psychological needs are manifested in the following aspects. Firstly, engaging in a technology-mediated environment meets their needs for autonomy. It enables students to be more self-motivated. Students possessed more control over their pace of learning. Compared to the sole learning style in the teacher-dominant face-to-face learning group, technology-mediated learning facilitates flexible learning pace and time, fosters independent learning skills, and supports personalized learning strategies (Rahman et al., 2015; Siew et al., 2015). Secondly, the increased self-confidence in EFL learning can be another reason why satisfaction in technology-mediated learning groups surpassed the face-to-face group. Students' self-confidence was strengthened as a result of increased access to learning resources and, as a result, a broader understanding of knowledge. Since English is a foreign language to Chinese students, the technology-mediated learning environment increased their exposure to the target language and chances to practice the target language. The interview result in this research reveals that students in the technology-mediated learning groups felt "more confident to express themselves in English". Our research result is consistent with Fisher et al.'s (2021) study that found that students' self-confidence increased as a result of FL. Technology-mediated learning was reported to promote students' self-efficacy through the online delivery of instruction videos before face-to-face classes (Lin et al., 2019). Thirdly, students' needs to relate to others were also strengthened by the diversified means for interaction, such as online discussion forums, instant messaging, emails, etc. For students who are too shy to communicate face-to-face, technology-enhanced learning provides them with alternative communicative options.

Secondly, the research results indicate that the technology-mediated learning models (both BL and FL) significantly satisfied students at a higher level than the face-to-face control group in their academic English learning. Of all the factors that can influence students' satisfaction such as learner, lecturer, course, technology, design, and environment, lecturer influence takes a stronger impact over the rest of the factors. According to the previous studies, the impact of instructors on students' satisfaction in face-to-face learning has been the focus of previous SDT research (Shin & Johnson, 2021). Our research indicates that instructor influence also plays a crucial role in student satisfaction in technology-mediated learning. Despite students' need for autonomy in the learning process, they also value the instructors' guidance in their learning process in technology-mediated learning. This shed light on the importance of teacher education and training to prepare for the effective guidance that promotes student satisfaction.

Thirdly, our research result indicates that students perceived BL and FL satisfied them at a similar level. Previous research has lacked direct comparisons between BL

and flipped learning in terms of student satisfaction, mostly previous comparative studies are between blended and face-to-face learning or between flipped and face-to-face learning (Filak & Nicolini, 2018). The present research indicates that while there is a significant difference in students' satisfaction between technology-mediated groups and face-to-face groups, the inclusion of flipping, which is the major difference between BL and FL in this research, does not necessarily satisfy students more. The present finding echoes the previous statement that FL is more applicable to highly motivated students (Kim, 2019). Since FL requests a high level of self-discipline to memorize knowledge before the face-to-face classes, the course then favors students with strong self-regulation. The prerequisite for self-discipline inevitably differentiates students. Students who lack self-discipline are prone to falling behind, becoming upset, and eventually abandoning their studies. The frustration experienced by those students may compromise the means of satisfaction with FL among the overall sample population.

Fourthly, the study reveals that when the workload is disproportionately large, students in both BL and FL have a psychological need to relieve stress. When online components in the technology-mediated learning environment exceed the acceptable level, students tend to feel stressed. Despite all the benefits, BL and FL can also pose several challenges that can lead to frustration (Abeysekera & Dawson, 2015; Nouri, 2016; Sun et al., 2017). For instance, pressure can be experienced by students who are less proficient in computer skills (Fisher et al., 2021). Students who are more confident with learning technology, are more likely to be engaged in classroom activities (Zhu et al., 2021). In this research, interviewees in this research expressed their feelings as "beneficial but challenging" that have to deal with foreign language anxiety alongside the online learning anxiety in their academic English course. Foreign language anxiety refers to the fear experienced by learners when they express themselves in the target language (Zhang & Chen, 2021). For example, interviewee 5 expressed her difficulty in adapting to the new changes. Despite her belief that FL positively influences her learning, she still finds it challenging to deal with sometimes.

My feeling is that I will be honest to say that a complete flip-learning, although it is positive, is something I feel is a bit unrealistic and challenging for me at the moment (Interviewee 5).

Therefore, a balanced paradigm would be more reasonable for a technology-enhanced learning environment to satisfy students' needs for autonomy, competence, relatedness, and pressure alleviation.

Conclusion

Although the technology-mediated learning environment has become a global trend due to the outbreak of Covid-19, there is limited concern about how technology-mediated learning influences students' satisfaction with academic English learning despite that technology-mediated learning is becoming a common form of learning. This research takes a social constructivism philosophical stand that students' satisfaction is constructed through the integration of their innate needs for autonomy, competence, and relatedness and the outside learning environmental factors, such as instructor, course, design, technology, etc. Firstly, the research findings show both BL and FL groups result in a higher level of satisfaction than the face-to-face group. This indicates that technology-mediated learning facilitates student satisfaction with academic English learning. Of all the learning environmental factors that relate to the technology-mediated learning, instructor factors obtain the highest means indicating that instructor influence still plays a crucial role in student satisfaction in the technology-mediated learning environment in the Chinese higher educational context. Secondly, there is no significant difference between BL and FL in student satisfaction. This indicates the inclusion of flipping does not necessarily satisfy more in their academic English learning. Thirdly, when the learning form is increasingly dependent on the technology-mediated learning mode, students tend to feel stressed about it.

Implications, Limitations, and Suggestions

This research provides practical implications with the academic English course design to course designers, instructors, and other stakeholders that it supports the application of a technology-mediated learning environment in the learning of academic English. Similar to face-to-face learning, teacher influence is important in promoting student satisfaction in a technology-mediated learning environment. Therefore, the related teacher education and training are necessary to prepare teachers professionally to adapt to a technology-mediated learning environment. Furthermore, this research reveals that students' stress threshold should be considered when the learning approach is getting highly dependent on technology-mediated learning. Both interviewees in both BL and FL expressed the need for stress alleviation and time to adapt to all the changes accompanied by the shift in learning forms.

There are some limitations to this study. First, at the time of conducting this research, only the first-semester students had access to the BL and FL learning model. A longer research period is needed to continuously investigate student satisfaction. Although this research lasted for one academic term, a longitudinal study is needed to further track possible changes in student satisfaction. Another limitation is the possible impact of individual differences on student satisfaction caused by the three different lecturers. Lastly, although lecturers delivered the same course content and assignments, it is not possible to ascertain the online study time students spent after the classes. Future investigations are needed to shed more light on the effects of different technology-enhanced learning modalities.

Acknowledgement

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