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Factors Impacting Satisfaction with Blended Learning Among Private College Students in Mianyang, China

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Abstract

Purpose: This research aimed to examine the factors of task technology fit, confirmation, cognitive presence, teaching presence, social presence, and learner-instructors interaction to impact blended learning satisfaction for two private college students in Mianyang, China. The research population targets undergraduates who majored in art and design subjects. **Research design and methodology:** This research applied the quantitative method and questionnaire as instruments. The sampling procedures are purposive, stratified random and conveneine sampling. Before distributing the questionnaires, Item-Objective Congruence (IOC) and a pilot test of Cronbach's Alpha were used to test validity and reliability. Data was analyzed by utilizing Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) to validate the model's goodness of fit and confirm the causal relationship among variables for hypothesis testing. This research surveyed 500 students through an online survey and tested the hypotheses. **Results:** Cognitive presence has a significant impact on social presence and satisfaction. Teaching presence has a strong impact on cognitive presence and no significant impact on satisfaction. Learner-instructor interaction has a significant impact on satisfaction. Confirmation and social presence have no impact on satisfaction. **Conclusions:** College managers should improve the information technology system to fit learning tasks and help teachers to raise their abilities to enhance teaching effectiveness. Students should obtain more training to improve their cognitive abilities using various approaches.

Keywords : Blended Learning, Task Technology Fit, Satisfaction, Private Colleges, China

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Cheung et al. (2010) explained that blended learning is an increasingly popular teaching approach that mixes the characteristics of face-to-face lectures and online learning in the digital age. Blended learning is a possible solution to solve pure e-learning problems. Especially, higher education has moved to personalized, effective, and cooperative learning– teaching changes that are predictable to convert the educational system from face-to-face mode to a technology-led interdependent method in which the main concern would be relied on developing creativities and potentials of the students in the best possible approaches in the current time (Bordoloi et al., 2021).

Studied by Lim and Morris (2009), affecting learning outcomes and learning applicability are key factors for

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lecture designing, keeping students interested in studying under a blended learning method. Ngan (2011) suggested that blended learning has an important influence on current learning and teaching approaches since it concerns different needs and wants of students. Hybrid learning expands the studying time and space. Some researchers showed the benefits of the blended learning method used in biology studying in a high school and obtaining similar results from laboratory courses (Yapici & Akbayin, 2012). The study demonstrated that students' attitudes and grades to the Internet were improved by using blended learning. According to Hinampas et al. (2018), blended learning methods have a positive and important effect on learners' academic performance and scientific process skills compared to traditional methods. Students can participate in physical classes, access online learning materials, and simultaneously communicate with teachers and classmates (Gašević et al., 2015). According to Liu (2021), face-to-face or online courses are less effective than blended instruction. Blended learning can lead to high student performance in all aspects, such as academic reading, writing, searching, and discovering. Teachers can simplify teaching content and help more students reach their full potential rather than only playing the guiding role in traditional teaching.

Developing successful blended learning requires establishing an entire and sound strategic system. In crises such as pandemics, wars, or natural disasters, online or blended learning approaches can meet the basic learning needs of learners. Therefore, it is necessary to understand what teachers and learners think about using blended learning models in teaching and learning transactions. According to the United Nations (2020), the pandemic of COVID-19 disrupted the education system historically, and it was calculated in more than 190 countries and continents with about 1.6 billion learners affected. The shutdown of schools and other learning spaces affected 94% of students worldwide. Most students have turned to different modes of e-learning. The so-called new normal for higher education included moving from face-to-face learning to e-online, canceling sports activities and events, impacting international student mobility, and damaging school finances since 2020 (Tesar, 2020). However, Tesar (2020) also pointed out that the pandemic has provided a chance to rethink innovation and creation in the educational areas now and in the future.

Traditionally, there are clear boundaries in teachers teaching activities. This situation is changing as the Internet has opened the wall of school education. In the era of artificial intelligence, teachers can construct hybrid teaching models based on real and virtual learning environments. The pandemic of COVID-19 had brought a driving power to consider how education could be changed by increasing technology usage and rethinking the accuracy of the assessment to determine if students are prepared well to meet the demands of their future careers. The opportunities and potential of maintainable valuation contribute to learning after completing a specific plan or course (Boud & Soler, 2016). According to two researchers, researchers, in the notable literature on the pandemic and its impacts on education, the rapid change from onsite to online studying resolutions is the most documented. Sambell and Brown (2021) stressed that blended learning could take interventions to change the evaluation of higher education, which can be viewed as an opportunity. Sambell and Brown (2021) continued to argue that the pandemic could have lasted and important modifications to future systems and processes as many other assessments' features were implemented online.

There reflect many pressures when academics move to online course delivery before, during, and after the pandemic of COVID-19. There needs to be more knowledge of alternative online learning and teaching instruments to increase online learning as academics depend on Zoom or similar platforms. Related industries must equip teachers and learners with instruments to deliver online learning materials. The industry must provide teachers with the tools to deliver and curate online and digital content (Wieland & Kollias, 2020). They emphasize equipping teachers to apply digital devices to create authentic online learning involvements in the post-COVID time. During COVID-19, there is some emphasis on the barriers to transitioning to e-learning distribution in developing countries. To develop asynchronous and synchronous learning works, planning and preparation are needed to offer some platforms to support e-learning and equip teachers with the technics to use technology (Verawardina et al., 2020). For example, 19 teachers were interviewed in India, and it was identified that a lack of technical Infrastructure affected the distribution of e-learning. Teachers had narrow awareness of online instructing platforms and obtained little support for participating in technology in lecture distribution (Joshi et al., 2021). This survey shows that the instrument supports collective knowledge establishing and arranging learners.

This research aimed to study the satisfaction of blended learning from students' perspectives. The research selected two private colleges that started blended learning in 2015 and massive use of blended learning in early 2020 as COVID-19 exposed. Blended learning is still highly emphasized in the two colleges to change both educational approaches. Two private colleges are Mianyan City College (abb. MCC) and Sichuan College of Cultural and Art (abb. SCCA), which are in Mianyan, known as the Science and Technology City in China and the second largest city in Sichuan province. The research chose students who are in majors designing disciplines in the two private colleges as the target population.

2. Literature Review

2.1 Theories Used in This Research

Potential determinants of satisfaction with blended learning were decided based on the four theories, which refer to The Expectation Confirmation Model (ECM), learning management systems (LMS), The Task-Technology Fit (TTF), and the model of a community of inquiry (CoI). According to Cheng (2014), ECM is applied to evaluate individuals' ongoing use intentions in different technological situations, such as using blended learning models. Bhattacherjee (2001) defined satisfaction as a psychological or emotional explanation that results from the cognitive assessment of the expectation-performance difference. ECM consists of four main factors: validation, perceived usefulness, intention to continue using, and satisfaction. The variables adopted for ECM were confirmation and satisfaction in this research context.

Among the various e-learning technologies, learning management systems (LMS) have become an important technology adopted in higher education (Green & Chewning, 2020; Rhode et al., 2017). Wichadee (2015) claimed that LMS could change traditional face-to-face learning by providing students with online learning spaces. According to Fearnley and Amora (2020), because LMS provides 24/7 access to course content while providing teachers with easy course creation and management, LMS has become an effective way to provide students with efficient learning. In this research, the variables associated with LSM were satisfaction and task technology fit.

Goodhue and Thompson (1995) claimed that the TTF model had become critical as it concentrated on matching technology and task requirements, especially in E-learning. Huang (2021) stated that when students find the technology is easy to use, they intend to believe in it, increasing their efficiency. They may feel satisfied with the technical support and continue using the related technology. When learners find technology useful, they also develop a sense of satisfaction and an intention to keep using it. When learners confirm that technology meets their expectations, they intend to believe that it will not only cost less effort but also improve learning performance. The variable adopted in this research includes task technology fit.

The CoI model is the process by which individuals in a group participate in knowledge formation and empirical investigation of problematic situations (Garrison et al., 1999). The CoI model primarily describes the components of an ideal learning experience in an asynchronous and virtual higher education environment. This model has been widely used for guidance in online learning environments. CoI comprises teachers and students for educational purposes (Swan et al., 2008). The variable adopted from this model refers to the cognitive presence, teaching presence, social presence, and learner-instructor interaction.

2.2 Task Technology Fit

Based on cloud-computing online learning, when students' experience using information technology systems meets expectations, their confirmation of IS/IT service expectations can improve their satisfaction with related services (Tan & Kim, 2015). Service quality is one of the important characteristics of measuring students' perception of using information technology (DeLone & McLean, 2003). Zhou et al. (2010) argued that even if the related technology is considered more advanced, it would not be applied by users who consider it unsuitable for the user's task needs. TTF assesses how information systems affect students' performance in online learning by matching task and technical characteristics. The researchers believe that the match between tasks and techniques influences decisions on student utilization and performance (Wu & Chen, 2017). Based on McGill and Klobas (2009), TTF helps students perform their portfolio of learning activities in the online learning system. Freeze et al. (2010) proposed that if the system meets the students' requirements, their satisfaction with the information system increases. Satisfaction with the effect of TTF on learning outcomes also increases. Learners' satisfaction is widely used to measure IS success (DeLone & McLean, 1992). Seta et al. (2018) suggested that quality of service is very important in the context of TTF for system usage and satisfaction. Hence, the researcher proposed the following hypothesis:

H1: Task technology fit has a significant impact on confirmation.

H2: Task technology fit has a significant impact on satisfaction.

2.3 Teaching Presence

Shea et al. (2003) suggested that teaching presence facilitates, designs, and directs social and cognitive processes, which means achieving better learning outcomes with personal meaning and educational value. Vaughan (2004) defined that when implementing e-learning, teaching presence is a vital factor in teachers' professional development. Teaching Presence helps students achieve meaningful and valuable learning goals through curriculum design, facilitation, and orientation. Teaching presence is important for establishing a curriculum system, facilitation approaches, and teaching methods (Garrison, 2011). Teaching Presence affects students' online learning and exploration processes. It significantly affects the communication and interactions in e-communities where content presentation, questioning, coaching, summarization,

and diagnosis of misunderstandings occur all the time. Therefore, establishing and maintaining an inquiry learning community requires a thoughtful and focused teaching presence (Garrison et al., 2010). Teaching Presence positively affected social and cognitive Presence but did not directly influence learning performance. Teaching presence had essential predictive impacts on cognitive Presence. Based on Akyol and Garrison (2008) and Shea and Bidjerano (2012), students' perception of teaching quality was vital in determining students learning behavior and outcome in a hybrid learning setting. Dempsey and Zhang (2019) demonstrated a research result that tested a hypothesis between cognitive and teaching Presence by using social Presence as a mediator. The result supported the conclusions of early studies conducted by Shea and Bidjerano (2009), Garrison et al. (2010), and Joksimović et al. (2015). Hence, the researcher proposed the following hypothesis:

H3: Teaching presence has a significant impact on cognitive presence.

H6: Teaching presence has a significant impact on satisfaction.

2.4 Cognitive Presence

Cognitive presence describes students' efforts and attempts to find the most effective solutions to learning problems and ultimately apply those solutions (Kozan & Richardson, 2014). Cognitive presence (CP) is explained as construction, exploration, resolution, and confirmation through interaction and reflection in the CoI model. These four stages include defining the problem or task, exploring relevant information and knowledge, and integrating ideas. These four stages take place in the environment of communication. They occur during reflection, synthesis, and analysis. Cognitive presence is essential to higher education success as an essential critical thinking component. (Garrison et al., 1999, 2010). Cognitive presence describes students' intentions which help to find the most effective methods to solve learning problems and can apply those solutions in the end (Kozan & Richardson, 2014). Hilliard and Stewart (2019) state that CP warrants further research in required skills-based courses. According to existing research, teaching and cognitive presence essentially became highly socialized correlation factors (Garrison et al., 2010; Shea & Bidjerano, 2009). This viewpoint also could be expressed that teaching presence had a predictive relationship with cognitive presence, whereas social presence was a mediator. Hence, the researcher proposed the following hypothesis:

H4: Cognitive presence has a significant impact on social presence.

H8: Cognitive presence has a significant impact on satisfaction.

2.5 Confirmation

Confirmation refers to the perceived agreement between users' expectations for using information technology and its actual performance (Bhattacherjee, 2001). When students feel the system improves their efficiency and performance in learning, they are willing to continue to use the online learning system (Cheng, 2013; Lee, 2010; Lwoga & Komba, 2015). Bhattacherjee (2001) pointed out that continuation intention means the user's willingness and behavior to continue to use the service after receiving the service. Xu et al. (2017) suggested that TTFs deemed more useful were more likely to be deemed satisfactory based on the online learning background. The confirmation of expectation theory shows that learners obtain expected benefits through the experience of using information technology, which positively impacts learning satisfaction. Users' perceived usefulness to information technology positively impacts satisfaction with technology (Bhattacherjee, 2001). Satisfaction is the premise for continued usage intent in a cloud-based context. Thus, when users are satisfied with computing services, they intend to continue using them more likely (Tan & Kim, 2015; Xu et al., 2017). Hence, the researcher proposed the following hypothesis:

H5: Confirmation has a significant impact on satisfaction.

2.6 Social Presence

Social Presence (SP) refers to students connecting with others emotionally and socially, which is a factor in the perception of presence by media and communicators. In blended teaching, SP is an important part of e-community and classroom communication (Jusoff & Khodabandelou, 2009; Mirabolghasemi & Iahad, 2016). Some theoretical studies have gone beyond assessing the impact of media on social existence (Iahad et al., 2012; Maddrell et al., 2017; Mirabolghasemi & Iahad, 201). Relevant studies have shown that SP is one of the important predictors of satisfaction and perceived learning achievement. SP is another factor affecting student satisfaction with the online learning environment (Delfino & Manca, 2007; Murphy & Rodríguez-Manzanares, 2008; Swan & Shih, 2019; Wise et al., 2004). Hence, the researcher proposed the following hypothesis:

H7: Social presence has a significant impact on satisfaction.

2.7 Learner-Instructor Interaction

According to Moore (1989), learner-instructor interaction means the interactive activities between students and teachers in online and offline teaching. Interaction is essential to inspire students' curiosities, which is an effective motivator to achieve learning objectives and success. Research shows that when there is teacher-student

interaction, the frequency, and intensity of the teacher's influence on students is far greater than when only students interact with learning materials. Lin et al. (2017) suggested that interaction can take place in online learning activities formally or informally. Interaction can also occur synchronously (online chat and video meeting) and asynchronously (email and discussion boards) through various channels. According to Cheng (2013), Teachers should provide adequate guidance in a blended manner, including offline and offline interactions, to students who need help acquiring knowledge and skills correctly in online learning. Paechter and Maier (2010) addressed that the interaction between learners and teachers promotes the establishment of harmonious social relationships by exchanging emotions and interests, thereby helping to form a good learning atmosphere. The higher the student satisfaction, the lower the outflow rate in online learning. Palmer and Holt (2009) claimed a variety of factors that affect satisfaction with an online learning environment. Learners' satisfaction is primarily related to their ability to conduct online learning, communicate with others, and understand the needs of success. Hence, the researcher proposed the following hypothesis:

H9: Learner-instructor interaction has a significant impact on satisfaction.

2.8 Satisfaction

According to DeLone and McLean (1992), students' satisfaction indicates their enjoyment and willingness to use the online learning system. Thus, satisfaction becomes one of the criteria to measure the success of the information system. Satisfaction is a main issue examining whether students continue to utilize an online learning system. User satisfaction measures successful interaction between users and information systems (Arbaugh & Duray, 2001). Satisfaction is also defined as the degree to which learners perceive that information systems can meet their needs. In online learning, satisfaction is the learner's satisfaction with the expected performance of the information technology system (Bhattacherjee, 2001). Satisfaction is an emotional response to a product or service experience and an emotional state (Spreng & Chiou, 2002). Satisfaction is considered one of the most significant elements in determining the quality of online learning and teaching (Allen & Seaman, 2010; Garrison & Cleveland-Innes, 2005; Moore & Kearsley, 2012). Thurmond (2003) suggested that teacher-student interactions influence college students' participation, performance, and satisfaction in learning programs. Instructors can provide teaching content for students in blended learning and prepare learners for the technical support and discussion environment for their learning. Thus, teachers play an important role in blended instruction (Abbas, 2018).

3. Research Methods and Materials

3.1 Research Framework

The research framework was composed of three main theatrical frameworks. The first previous research framework was conducted by Cheng (2019), studying the relationship among these constructs: task characteristics, technology characteristics, task technology fit, confirmation, perceived usefulness, satisfaction, continuance intention, and perceived impact.

The second previous framework previous research framework was conducted by Mirabolghasemi et al. (2019). This study comprehensively analyses these constructs in blended learning: information quality, system quality, teaching presence, cognitive presence, social presence, and satisfaction. These researchers also discussed the learning management systems (LMS) and community of inquiry (CoI). The third previous framework was conducted by Leong et al. (2021), who studied the relationship among these constructs: learner–instructor interaction, learner-learner interaction, learner–content interaction, self-regulated learning, Internet self-efficacy, and online learning satisfaction. The research framework was built with seven variables illustrated in Figure 1.

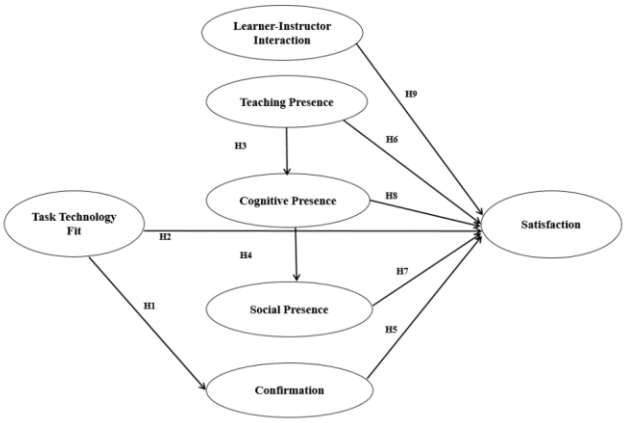

Figure 1: Conceptual Framework

H1: Task technology fit has a significant impact on confirmation.

H2: Task technology fit has a significant impact on satisfaction.

H3: Teaching presence has a significant impact on cognitive presence.

H4: Cognitive presence has a significant impact on social presence.

H5: Confirmation has a significant impact on satisfaction.

H6: Teaching presence has a significant impact on satisfaction.
H7: Social presence has a significant impact on satisfaction.
H8: Cognitive presence has a significant impact on satisfaction.
H9: Learner-instructor interaction has a significant impact on satisfaction.

3.2 Research Methodology

The study was conducted using a quantitative method to collect data from undergraduates with at least one year of experience with blended learning in private higher education institutions. The data collection was examined by executing factor analysis and correlation regression analysis through CFA and SEM for research outcomes. 500 valid questionnaires were gathered from undergraduates in blended learning in the two colleges. The questionnaire comprises three sections: screening questions for filtering respondents to the target groups, variable measurement using the Five-Point Likert scale, and the target respondents' demographic information. Multi-stage sampling procedures were also employed to ensure that target respondents could be reached from the selected private colleges. The reliability test was conducted utilizing the IOC tool with three experts before the questionnaires were delivered. A pilot test of CA with 30 respondents was applied. The stratified sampling allocated the sample size to each group based on the number of students proportionately. The purposive and convenience sampling was conducted to select students who had experience with using online platforms for academic learning longer than one year. The researcher conducted the construct validity, which contained CV and DV according to CFA based on the tools of SPSS 24.0 and AMOS 18.0. The researcher utilized SEM to investigate the nine hypotheses and identify the critical influences which affected satisfaction with blended learning and generated conclusive implications for this research.

3.3 Population and Sample Size

The target population includes people, events, and records, which are study elements (Cooper & Schindler, 2011). In this research, the population focused on private college students in Mianyang, the second large city in Sichuan province. In MCC and SCCA, the target population was undergraduates who majored in art and design disciplines: environmental design, visual communication design, and product design. The three majors have similar teaching and learning characteristics in blended learning.

MacCallum et al. (1996) suggested that the ideal sample size may depend on many other issues. The required efficiency of the study, the complexity of the overall model, and the tested null hypothesis determine the sample size requirements. This research had seven latent factors: TTF, CF, SP, TP, CP, LII, and ST. The variables contained forty observed measurement items. Hair et al. (2007) stated that an adequate sample size is 30 to 500 for most studies. The researcher selected 500 samples from two colleges to ensure a reliable statistical outcome.

3.4 Sampling Technique

The sampling procedures were employed. First, purposive sampling was used to ensure that target respondents are from the selected private colleges. Secondly, stratified sampling was adopted to create strata, in which each stratum represents an individually selected college. A proportional stratified sampling allocated 500 samples to each stratum to ensure the sample was representative per shown in Table 1. For convenience sampling, the questionnaire survey was conducted in two groups covering two Mianyang colleges. The questionnaires were distributed to each group according to the proportional sample size calculated.

Table 1: Sample Units and Sample Size

College Name	Population Size	Proportional Size
MCC	1049	241
SCCA	1125	259
Total	**2174**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

In MCC and SCCA, the respondents are 171 males and 329 females, representing 34.2% and 65.8%, separately from Table 2. In this group, Year Two student account for 16.6%, Year Three student account for 39.4%, and Year Four student account for 44%.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	171	34.2%
	Female	329	65.8%
Grade	Year Two	83	16.6%
	Year Three	197	39.4%
	Year Four	220	44%
Duration of using blended learning	Less one year	114	22.8%
	One year	163	32.6%
	Two years	99	19.8%
	More than two years	124	24.8%

Source: Constructed by author

4.2 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) was applied before analyzing the measurement model with a structural equation model (SEM). According to Hair et al. (2006), the CFA results show that all items in each variable are important, as factor loading is to prove the validity of discrimination. In Table 3, the empirical data shows that the constructs have a coefficient of internal consistency under the rule of thumb that Cronbach's Alpha (CA) value should be 0.70 or above (Dikko, 2016). Factor loading of each variable was also above 0.5 at a t-value >1.98 and p-value<0.5 (Hair et al., 2010). According to Fornell and Larcker (1981), composite reliability (CR) was greater than 0.7, and the average variance extracted (AVE) was greater than 0.5 for all constructs. Summarily, the statistical estimates were significant.

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Task technology fit (TTF)	Cheng (2019)	4	0.895	0.790-0.856	0.896	0.683
Confirmation (CF)	Cheng (2019)	3	0.872	0.816-0.846	0.873	0.697
Teaching Presence (TP)	Mirabolghasemi et al. (2021)	9	0.937	0.703-0.838	0.935	0.617
Social Presence (SP)	Mirabolghasemi et al. (2021)	7	0.925	0.741-0.833	0.923	0.631
Cognitive Presence (CP)	Mirabolghasemi et al. (2021)	9	0.942	0.767-0.857	0.947	0.664
Learner-instructor interaction (LLI)	Leong et al. (2021)	4	0.906	0.716-.0.832	0.858	0.603
Satisfaction (ST)	Cheng (2019)	4	0.857	0.783-0.892	0.902	0.697

CFA was used to examine the acceptability of all items constructed in this conceptual framework model (Bollen, 1989). According to Hair et al. (2010) and Gefen and Straub (2003), all results are required to consistently meet the acceptable threshold levels. The MCC and SCCA model fit was presented through the values of the goodness of fit indices in Table 4. The after-modification values were acceptable to compare with the acceptable criteria, shown as CMIN/dF = 2.803, GFI = 0.830, AGFI = 0.805 NFI = 0.886, CFI = 0.923, TLI = 0.917, RMSEA = 0.060. All indices satisfied the acceptable criteria, leading to an affirmed fitness of the model.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/df	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2006.815/2.803
GFI	≥ 0.80 (Doll et al., 1994)	0.830
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.805
NFI	≥ 0.80 (Wu & Wang, 2006)	0.886
CFI	≥ 0.80 (Bentler, 1990)	0.923
TLI	≥ 0.80 (Sharma et al., 2005)	0.917
RMSEA	< 0.08 (Pedroso et al., 2016)	0.060
Model Summary		**In harmony with empirical data**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker–Lewis index and RMSEA = Root mean square error of approximation.

Discriminant validity (DV) is important for research because it comprises a variety of latent variables with several norms representing the constructs (Hamid et al., 2017). Researchers must compare the squared coherence of a pair of constructs with AVE for each group of constructs suggested by Fornell and Larcker (1981). The discriminant validity test is evaluated by calculating the square root of each mean variance. In this study, the values of discriminant validity were all larger than inter-construct correlations, and the inner data were all less than 0.8 from Table 5. Thus, the discriminant validity was effective.

Table 5: Discriminant Validity

	TTF	CF	TP	SP	CP	LII	ST
TTF	**0.826**						
CF	0.780	**0.834**					
TP	0.589	0.661	**0.785**				
SP	0.555	0.618	0.744	**0.794**			
CP	0.528	0.605	0.734	0.724	**0.814**		
LII	0.588	0.622	0.665	0.699	0.799	**0.776**	
ST	0.496	0.554	0.667	0.683	0.769	0.754	**0.834**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

SEM analysis tests the fit between a model proposed by researchers and the sample data, that is, the degree of fit of the overall model. (Bentler & Bonett, 1980). The structural model was assessed using SEM to confirm the model's fitness, the causal relationship among variables, and factors impacting satisfaction when using blended learning in higher education. Based on Byrne (2010), structural models demonstrate the relationship path between the latent

variables, which can be direct or indirect. For MCC and SCCA, the statistical values of indices are shown in Table 6, which illustrates the model's fitness as the statistical values from SEM are compared with the acceptance criteria. The statistical values of indices were shown as CMIN/df = 3.185, GFI = 0.829, AGFI = 0.800, NFI=0.873, CFI = 0.909, TLI = 0.899, RMSEA = 0.066. All indices satisfied the acceptance criteria, leading to an affirmed fitness of the model.

Table 6: Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/df	< 5.00 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	2232.412/3.185
GFI	≥ 0.80 (Doll et al., 1994)	0.829
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.800
NFI	≥ 0.80 (Wu & Wang, 2006)	0.873
CFI	≥ 0.80 (Bentler, 1990)	0.909
TLI	≥ 0.80 (Sharma et al., 2005)	0.899
RMSEA	< 0.08 (Pedroso et al., 2016)	0.066
Model Summary		**In harmony with empirical data**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker–Lewis index and RMSEA = Root mean square error of approximation.

4.4 Research Hypothesis Testing Result

Regression coefficients or standardized path coefficients measured the coherence between the independent and dependent variables proposed in the hypotheses. In the research results from MCC and SCCA, as displayed in Table 7, six proposed hypotheses were supported, as three were not supported.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-Value	Result
H1: TTF→ CF	0.882	17.162***	Supported
H2: TTF→ ST	0.295	2.804*	Supported
H3: TP → CP	0.843	15.152***	Supported
H4: CP→ SP	0.935	17.640***	Supported
H5: CF→ ST	-0.018	-.165	Not Supported
H6: TP→ ST	0.336	-1.156	Not Supported
H7: SP→ST	-0.182	-1.114	Not Supported
H8: CP→ ST	0.513	17.640***	Supported
H9: LII→ ST	0.531	10.409***	Supported

Note: *** p<0.001, * p<0.05
Source: Created by the author

H1: TTF has a second high impact on confirmation that the path relationship of cognitive presence and satisfaction has a standardized coefficient of 0.882 and a t-value of 17.162.

H2: TTF has impacts on satisfaction with the standardized coefficient of 0.295 and the t-value of 2.804. This is consistent with the early studies from Khan (2017), which concluded that TTF positively influences behavioral intentions for blended learning. Janson et al. (2017) claimed that TTF significantly affects the degree to which learners apply the LMS. Cheng (2019) proposed that TTF has contributed to learners' confirmation and satisfaction with blended learning.

H3: TP significantly impacts cognitive presence according to the standardized coefficient of 0.843 and the t-value of 15.152. These results can be supported by the previous study by Law and Li (2019), which indicated that teaching presence had a direct positive impact on social and cognitive presence.

H4: CP has the most decisive impact on SP and ST because of the standardized coefficient of 0.938 and t-value of 17.640.

H5, H6, and H7: The standardized coefficient and t-value revealed that confirmation, teaching presence, and social presence had no significant impact on satisfaction. This means the empirical data did not support the three hypotheses. These conclusions were supported by the following previous studies, which were displayed separately. According to Khan and Tariq Rafi (2020), the social presence and relationship satisfaction statistics differed from the two variables. Mirabolghasemi et al. (2019) claimed that no evidence proved an essential connection between social presence and satisfaction by applying LMS from a blended learning mode. However, their study indicated that teaching presence and cognitive presence influence satisfaction. Horzum (2017) pointed out that social presence in e-learning was proved positive by study participants' interaction and negative by the courses' structure. Perspectives from Law and Li (2019), social presence was only impacted by learning motivation positively rather than other factors. Moreover, their opinion also included that teaching presence indirectly positively impacted learning performance. Therefore, these research results were aligned with the previous study presented above.

H8: CP has the most decisive impact on social presence and satisfaction. The path relationship of cognitive presence and social presence has a standardized coefficient of 0.513 and a t-value of 17.640.

H9: LII is significant in satisfaction at the standardized coefficient of .531 and the t-value of 10.409. This reinforced some other studies by Leong et al. (2021) that claimed LII was the critical factor in learning satisfaction.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

This research has determined the essential factors which impacted blended learning satisfaction by art and design students in two private colleges in Mianyang, Sichuan province. The research sample size of data collection was 500 samples referenced from the minimum sample required at 440. To obtain quantitative data from 500 samples for each group, a questionnaire was used as a tool. Five hundred valid questionnaire surveys were gathered from MCC and SCCA.

The proposed conceptual matrix was developed from the theories of ECM, LMS, TTF, and CoI, followed by studying some literature. The latent factors included TTF, CF, SP, TP, CP, LII, and ST. The elements contained forty observed measurement items in total. The researcher conducted the construct validity, which contained CV and DV according to CFA based on the tools SPSS 24.0 and AMOS 18.0. The researcher utilized SEM to investigate the nine hypotheses and identified the critical influences which impacted satisfaction with blended learning and generated conclusive implications for this research. According to the research findings, six hypotheses were supported, and three hypotheses were not supported.

To conclude, the research results from MCC and SCCA, and the findings revealed that certain factors in the conceptual model have significant impacts on students' satisfaction, apart from CF, TP, and SP. CP has the strongest impact on SP and ST, as TTF has a critical influence on CF. The findings also demonstrated that cognitive presence and learner-instructor interaction are more important in blended learning satisfaction.

For MCC and SCCA, satisfaction was significantly impacted by task technology fit, cognitive presence, and learner-instructor interaction. Students in the two colleges agreed that TTF impacted the confirmation, as social presence influences cognitive presence. However, students disagreed that confirmation, teaching, and social presence strongly impacted satisfaction based on the empirical data analysis. Compared with offline teaching, the study suggested that teachers should be more concerned about students as they deliver lectures online. The college managers and lecturers should help build a positive and active communication atmosphere among the students' social circle.

Moreover, expressing and sharing their opinions in blended learning can help establish confirmation and confidence. Moreover, this research also suggested that college students get more training and motivation to overcome learning barriers, which helps to establish confidence. These suggestions help students to continue online learning in this lifetime learning age. Furthermore, colleges need to utilize Internet technology to develop the advantages of hybrid teaching. Based on the data from online platforms, college managers should mine data related to learning satisfaction, improve the quality of teaching, and promote the diversification of teaching models for hybrid teaching, especially in the two private colleges in Mianyang. Meanwhile, teachers' teaching information literacy should be greatly improved.

5.2 Recommendation

In MCC and SCCA, cognitive presence was the strongest predictor of social presence and satisfaction. This research result was like the first group of respondents. Teaching and social presence indirectly affected the students' satisfaction in the two colleges. Task technology had a substantial impact on confirmation. However, confirmation had no direct effects on satisfaction. This empirical data proved that even though students felt confirmed that the internet technology matched blended learning tasks, this did not increase their learning satisfaction. According to this research, lacking various forms of social communication led to low learning satisfaction. The data also proved that the level of teaching presence had yet to lead to satisfaction with blended learning. These two conclusions indicate that school managers should consider improving the satisfaction of blended learning from other aspects, for example, by enhancing communication between teachers- students, and student peers and encouraging teachers to improve online and offline teaching methods. Therefore, lecturers must design more exciting and valuable questions, discussions, quizzes, activities, and debates to enrich blended teaching and learning.

In this research, cognitive presence, and learner-instructors' interaction significantly impacted satisfaction. Meanwhile, teaching presence did not significantly impact student satisfaction in the four schools for art and design subjects. These two points indicate that private school students majoring in art and design have a lively and communicative personality. Students prefer to enhance their cognitive level with a blended learning model through various social activities in and after class, improving their learning satisfaction. Meanwhile, school administrators need to pay more attention to consider how to enhance teachers' lecturing design ability. Hence, the two colleges are suggested to improve teaching methods and encourage social communication between lecturers and peers online and offline. Teachers can reorganize teaching content based on real problems, create learning contexts that adapt to different learning contents, adopt proactive, exploratory, and project-based learning methods, create more practical and hands-on opportunities, and enable students to grasp the

deep connection between knowledge and practical change in the process of solving practical problems. In terms of creating learning situations, it is possible to create situations based on problems and construct classroom teaching using problem research as a platform. It is also suggested to create some open, real-life, and realistic teaching situations, especially freeing them from abstract and boring concept learning and moving towards life, so that students can truly feel the joy of learning and more effectively promote their learning.

The Center for Teaching Quality and Teacher Solutions 2030 Team of the United States has jointly developed Teaching 2030. The report puts forward six policy levers, makes a professional prediction and design for the teaching of 2030, and draws a teaching blueprint for the United States in 2030. This article analyzes the report to understand its implications, which may provide useful inspiration for China's educational reform now and in the future. According to the report, if future teachers will be developers of learning resources and courses, researchers of students' internal learning mechanisms, and teaching service providers, they need to achieve a high degree of integration of content, methods, and technology. Thus, teachers' education must also adapt to this trend and make timely changes (Deng & Peng, 2017).

In practice, according to this study, private college managers are suggested to consider these issues. Firstly, teachers' ability to develop courses and learning resources based on digital technology must be at the core of teacher professional education. College administrators must form a teacher-professional education system that can adapt to future learning, teaching, and education development trends and is committed to promoting students' autonomous learning and personalized learning. Secondly, colleges need to construct a teachers' professional education system so that well-trained teachers can promote students' autonomous learning and effectively integrate technology and learning. Thirdly, teacher professional organizations or governments must take action to formulate new teacher professional standards that are compatible with future learning, teaching, and educational changes and point out the direction for teacher professional development. Fourthly, it is necessary to make teachers have the comprehensive competency to respond to the coming educational changes so that teachers can become creators, leaders, and priority demonstrators under the background of blended learning and teaching.

5.3 Limitation and Further Study

Some limitations to this research need to be identified, and some suggestions need to propose for further study: 1) This research only focused on private colleges and gathered data from four chosen institutions in two cities. Therefore, the research scope and sample size were limited; 2) The theme of this research only examined students' satisfaction with blended learning; 3) Satisfaction was just one dimension to evaluate the effectiveness and efficiency of hybrid learning; 4) Participants in the research targeted underground students who majored in art and design subjects.

Meanwhile, the research had yet to choose teachers as respondents. This research focused on private college students with experience in blended learning. However, this research's questionnaire and data collection period was in strict epidemic prevention and control policy in the two cities. Students had long-term pure online learning rather than blended learning. Some had inevitable boredom and dissatisfaction, leading to partly unrealistic reflection and feedback for the questionnaire survey.

To sum up, this research only focused on undergraduate students majoring in art and design from private colleges in two cities in Sichuan as a sample to investigate their satisfaction with hybrid teaching. Due to the diversity of teaching resources in different regions of China, and the varying degrees of mixed teaching in different higher educational institutions, the conclusions of this research would be more representative if the sample selection was broader. Therefore, it is necessary to collect other samples from different colleges and universities in different regions for research.

With the rapid development of technology in the 21st Century, enormous changes have occurred in the requirements of learning environment and skills. For that reason, learning and teaching should make a change accordingly. Further study might suggest considering teachers as participants in obtaining their opinions about viewing students' satisfaction with hybrid learning from a teaching angle. In future studies, researchers might be suggested to consider more factors such as perceived usefulness, performance expectancy, attitude to use, learning motivation, quality of information, service quality, and so on. Additionally, qualitative research might be suggested to apply a better understanding of college student perspective on hybrid learning. Research methods, such as focus group interviews with students, teachers, and other college staff, might be added to expand the sample and data collection.

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