An Experiential Learning Perspective on Students' Satisfaction Model in a Flipped Classroom Context

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ABSTRACT

Recent years have witnessed an increasing interest in the flipped classroom model, and many flipped programs have been funded and implemented to explore the effectiveness of this new model. However, previous studies centering on comparative assessment have indicated that it is not always entirely successful in terms of promoting students' performance and/or satisfaction, which warrants further research on the contributing factors and driving mechanism accounting for students' perceptions of flipped settings. In order to fill this gap, in this study, a students' satisfaction model for the flipped classroom was constructed based on the experiential learning theory. A total of 178 undergraduate students in Mainland China participated in 32-week College English flipped classes, from whom 146 valid questionnaires were obtained. The proposed research model was evaluated through longitudinal surveys followed by the structural equation modeling technique. The results indicated that, compared with the designs of Personalized Learning Climate, learners' Prior Learning Experience is a far more significant antecedent for predicting their satisfaction. Furthermore, Perceived Quality (with five first-order dimensions) and Perceived Value are two vital mediators to student satisfaction. The implications of this study are also discussed.

Keywords

Flipped classroom model, Satisfaction, Experiential learning, Prior learning experience, Personalized learning

Introduction

Currently, the Flipped Classroom Model (FCM), featuring especial emphasis on students' engagement and experience (Bergmann, Overmyer, & Wilie, 2011), is increasingly attracting educators' interest, resulting in the *flipped classroom phenomenon* (Blair, Maharaj, & Primus, 2015). Many colleges and universities are funding and developing FCM programs focused on comparative assessments of students' examination scores and/or attitudes (Tune, Sturek, & Basile, 2013; Schultz, Duffield, Rasmussen, & Wageman, 2014; Baepler, Walker, & Driessen, 2014; Kong, 2014). However, the results vary greatly, which aroused our curiosity about what factors drive effective flipped pedagogy, and how they can be efficiently implemented in further teaching practice.

The learners' satisfaction model warrants keen interest in this new and exciting research field, because learners' perceived satisfaction has been proven to be a vital predictor of learning outcomes and behavioral intention to continue learning (Tsai, Lin, & Tsai, 2001; Liaw, 2008). In addition, student satisfaction has a close relationship with learners' active participation and team collaborative learning (Johnson, Top, & Yukselturk, 2011; Ku, Tseng, & Akarasriworn, 2013), which is of great significance in effectively implementing the flipped classroom pedagogy. However, the existing studies ignore the fact that learners' satisfaction should be especially discussed through the lens of learners' experiential learning, the main feature of FCM. Some researchers have also urged further studies on the activity-oriented nature of flipped learning when exploring the learner satisfaction model in FCM (Chen, Wang, & Chen, 2014).

Experiential Learning Theory (ELT) is an applicable theoretical foundation to investigate learners' satisfaction in flipped settings. Based on the ELT, we proposed that personalized learning climate (*flipped design*) and relevant prior learning experience (*angle from learners*) have close relationship with learner satisfaction. For one thing, there exist no one-fits-all approach for students who have distinct learning capacities and styles; thus experiential learning especially addresses the importance of creating a personalized learning climate to meet individuals' special needs (Sims, 2002), and the flipped settings offering learners more flexible learning arrangements are expected to relate to learners' satisfaction. Secondly, learners' relevant prior learning experience may significantly predict their satisfaction in flipped settings. The ELT proposed that learners' relevant prior learning experience, such as information retrieval and online interaction, are available inputs for improving learners' personal or group effectiveness (Kohonen, Jaatinen, Kaikkonen, & Lehtovaara, 2014). Based on ELT, some researchers have also appealed for more opportunities for students to implement reflection and reconstruction of

previous experience and new ideas (Oxley & Ilea, 2015), which is in accordance with the philosophy of flipped pedagogy.

In order to further explore the mechanism of how these two factors predict students' satisfaction, the current research employed perceived quality and perceived value as two mediators in the proposed model. The former addresses the assessment of the course content, while the latter centers on learning efficiency which sheds light on whether the course contents are effectively organized and implemented. In a flipped context, personalized learning procedures and a wealth of blended learning experience are helpful for learners to comprehend the course contents and to master the techniques of learning, which is followed by improving learners' satisfaction. It has also been suggested by previous studies that perceived quality and perceived value act as significant mediators of learner satisfaction (Shi, 2010; Lee, 2010).

The current survey empirically aims to construct a theoretical model which is reliable for predicting undergraduates' satisfaction in FCM context from the perspective of learners' experiential learning. Additionally, for the practical implication, the current research can assist educators in effectively utilizing and improving the flipped approach to enhance learning perceptions and outcomes.

Research background and hypotheses

Flipped classroom model

Distinct from the traditional lecture-plus-homework formula, in the FCM context, the externalization of knowledge is previously carried out through online courses, information searching and online discussion at the learners' own pace, rather than passively receiving information. On the other hand, the internalization of knowledge is conducted in face-to-face classes through collaborative work (such as discussion, argument and retrospection) among peers and instructors to solve targeted problems. Besides, online interactive platforms (e.g., chat rooms, BBSs) are used for the online exchange of ideas (Marcey & Brint 2012; Chen, Wang & Chen, 2014). Synthesizing the above definition, we proposed that FCM consists of three basic pillars: (1) online videos, (2) physical classes, and (3) an interactive platform. Compared with the traditional blended learning model, the FCM replaces the passive, didactic format with a model of initiative and personalized education. It creates a student-centered learning atmosphere involving problem-based learning (PBL) modules to enhance critical thinking and self-directed learning skills (Mason, Shuman, & Cook, 2013).

Prior literature concerning FCM learners' satisfaction has indicated that this approach is not always completely successful in promoting students' favorable perceptions. Some surveys have found that the students' perceptions were far more positive towards the FCM than the traditional approach (Butt, 2012; Marlowe, 2012; Baepler, Walker & Driessen, 2014). Nevertheless, Blair, Maharaj, & Primus's (2015) survey found no significant change in relation to students' attitudes, while Bishop and Verleger (2013) even found that a few students strongly disliked the flipped model.

Some prior research was dedicated for exploring the factors driving learners' varied perceptions. Bergmann and Sams (2012) emphasized the importance of content delivery in their Flipped Mastery Model, while Davies, Dean, and Ball (2013) found that the effective application of technology in a flipped classroom is a vital predictor of learners' motivation. Another survey indicated that active learning classrooms with efficient use of physical space have close relationships with learners' perceptions of flipped settings (Baepler, Walker & Driessen, 2014). However, prior studies have been mainly confined to the perspective of course components. The exploration of learners' satisfaction must be from the perspective of students' experiential learning, as a result of which FCM especially features stress on individual arrangement and students' engagement. There is thus an urgent need to construct a holistic satisfaction model from the perspective of the students' learning experience, with which future flipped pedagogy practice could be improved.

Theory and hypotheses

Experiential learning theory

Experiential learning theory, developed from the work of John Dewey and Kurt Lewin, is applicable to the theoretical foundation of this study. The core concept of ELT emphasizes that learners' experience has great potential to contribute to knowledge construction and comprehension (Kolb, 1984). Experiential learning,

involving a creative tension among four learning modes—*concrete experience, reflective observation, abstract hypotheses,* and *active testing,* follows a repeated cycle of continuous experience and exploration, and is portrayed as a spiral learning cycle during which the learner "touches all the bases" (Kolb & Kolb, 2005).

The procedure of FCM is in accordance with the ideology of experiential learning. Learners firstly consolidate their *experiences* through online courses, at which stage there possibly exist some difficulties or speculations on the part of the learners. Then online chat and a Q&A platform are utilized for *reflective observation,* during which the pre-viewed online lectures could be better understood. The learners' perception of quality is thus improved. However, individuals' understanding and thinking may not reach the consensus, and the *abstract conceptualization* of their comprehension requires sharing and mutual consultation among instructors and peers. At this stage, the learners not only get their personalized solution but also learn more from the instructor's and peers' diverse answers. Their perceived value may then be enhanced. When reflections are summarized into abstract concepts under the instructor's guidance and peers' mutual feedback in physical classes, new implications can be drawn. This is then followed by *testing* what they have obtained. Finally, they prepare to engage in the next experiences.

Prior learning experience and student satisfaction

Experiential Learning Theory emphasizes the significance of learners prior experience – such as technology utilization, teaching style – to the effectiveness of their study, as learners' prior experience would generate their reflection, which could then be applied to new contexts to guide their learning activities (Chen, Wei, Liu, 2011).

Additionally, the ELT considers learning as a process carried out under the stimuli of the learner's own direct experience or reacting from external observation, and knowledge is created through the transformation of experience. Then prior experience not only simply directs a person, but also affects the formation of their attitudes, desire and purpose (Kolb, 2014). Xu et al. (2014) also posited that the educational situation is supposed to be modified according to the learners' prior experience. In the flipped context, learning effectiveness and preferences largely rely on learners' previous technical mastery, such as the application of online courses and interactive platforms, which is in accordance with the implications of prior studies (Sahin & Shelley, 2008; Teo, 2013). Moreover, prior learning experience in the current research ought to be defined with new conceptions, considering that the procedure of flipped classes is integrated by on-and-off learning models, or blended learning, from which learners' participation frequency and preference for blended learning constitute their prior learning experience in flipped settings. Synthesizing these thoughts leads to the following hypothesis:
H1. Prior learning experience is positively associated with students' satisfaction in FCM.

Personalized learning climate and student satisfaction

Personalized learning climate could be perceived as a pedagogical approach for adjusting to students' learning style and pace (Dabbagh & Kitsantas, 2012), which empowers students to select favored techniques and materials to efficiently manage, create and package learning content (McLoughlin & Lee, 2010). The flipped procedure provides the learners with an environment in which the learning arrangement could be adjusted to their own learning pace, approach and interests. Specifically, before the class, students can operate the video lectures (*forward, replay, or pause to search for information*) by adjusting themselves to their preference, and they do not need to worry about their inconsistent learning progress with other classmates. Such a *fair atmosphere* helps to promote their psychological wellbeing; students also feel more confident in the physical classroom as a result of the fact that their target problems have been previously prepared and negotiated, and the online platform is readily available for their instant recourse. Thus, it is suggested that a Personalized Learning Climate (PLC), the typical feature of flipped settings, is a significant predictor of learners' perceptions. Earlier research has supported that the correlation between learners' satisfaction and the personalized system is very high (Chen, Lee, & Chen, 2005). An empirical field experiment conducted by Xu, Huang, Wang, and Heales (2014) found that personalized e-learning facilities can enhance online learning effectiveness in terms of examination, satisfaction, and self-efficacy, since personalized settings offer learners an environment in which their ideas can be explored, compared and critiqued. Synthesizing these findings leads to the following hypothesis:
H2. Personalized learning climate is positively associated with students' satisfaction in a flipped classroom.

Perceived quality in FCM and its role as mediator

Based on the definition of FCM, it consists of three basic pillars – online video, face-to-face discussion, and interaction with the online platform – all of which should be considered to contribute to the learners' perceived quality. Previous research has concluded that in e-learning contexts the effect of perceived quality is mainly measured by ease of using the information system, the reliability of using information technology, and interactive response (Chiu et al., 2005). While in the settings of flipped classrooms the dimensions of interactive platforms and online courses have a close relationship with information technology, additionally flipped settings emphasize effective interaction among instructors and peers in physical classes for promoting teaching quality. Thereby, students' Perceived Quality in the current research is proposed to be constructed of five assessment factors: *(1) Ease of using the online course (EUOC); (2) Usefulness of the online course (UOC); (3) Ease of using the platform (EUP); (4) Usefulness of the platform (UP);* and *(5) Interaction in physical classes (IPC)*.

There is a substantial amount of literature elaborating that perceived quality is a vital driver of learners' satisfaction (Helgesen & Nesset, 2007; Ribbink, Van Riel, Liljander, & Streukens, 2004). Such a mechanism, we suppose, is still available in flipped pedagogy, since the perceptions of ease of use and usefulness of information technology are generated through long-term learning experiences, and learners have such a deep understanding of them that their overall perceptions can be justified.

Perceived Quality is proposed to mediate Personalized Learning Climate/Prior Learning Experience and Student Satisfaction in flipped settings. Firstly, considering that FCM is such a complex integration of educational technology and flipped settings that learners certainly have a vague concept of it, learners' prior experience concerning blended learning helps to improve their perceptions of the ease of use and usefulness of the interactive platform and online course. Besides, students with more experience of internet-based courses have been found to perceive higher capability and appeared to be more interested in collaborative work (Lee & Tsai, 2011). Prior blended learning experience is therefore considered to highly predict Perceived Quality. Secondly, in flipped settings, learners can speed up/slow down the learning pace, adjusting how much they learn according to their own learning progress, which is helpful for them to better understand the lessons, and more easily submit, search for, and collect needed information. Similarly, learners in physical classes would perceive more effective interactions when their targeted personal problems are settled. Therefore, the following hypotheses are proposed:
H3a. Perceived quality is positively associated with student satisfaction in FCM.
H3b. Prior learning experience is positively associated with perceived quality in FCM.
H3c. Personalized learning climate is positively associated with perceived quality in FCM.

Perceived value and its role as mediator

Perceived Value, defined as perceived assessment of "how much received versus cost," is a vital measurement indicating learning efficiency, which needs to be carefully considered when evaluating learners' perceptions (Chiu et al., 2005). Meanwhile, distinct from general commodities, educational activity deserves to be assessed by consumed time rather than charged expense. The ratings of consumed time and learning effectiveness were thus utilized to assess learners' perceived value in this study.

Learners' perceived value is positively related to their satisfaction (Chiu et al., 2005). When determining to adopt a new learning model, such as flipped pedagogy, students are likely to expect to achieve their study mission more efficiently, and they may be sensitive to how much they receive versus how much they spend. Once such an expectation is satisfactorily achieved, their overall satisfaction would then be greatly improved. Additionally, relevant previous learning experience may also contribute greatly to the enhancement of perceived value. In flipped settings, individuals unfamiliar with the learning settings inevitably need time to cultivate the study techniques required to exploit the new technology (*hardware and software*) and blended learning skills. Users more familiar with them are more likely to identify the requisite learning skills and to become proficient in their use (Owens, Hardcastle, & Richardson, 2009). Besides, earlier research has indicated that students learning with a personalized learning climate had higher learning effectiveness (Mohd, Shahbodin, Pee, & Hanapi, 2013). In flipped pedagogy, personalized assistance supported by an interactive platform is beneficial for learners to meet their specific needs timely, and their perceived value will be further enhanced as their target individual issues are dealt with in physical classes. Based on the above analysis, we propose that:
H4a. Perceived value is positively associated with student satisfaction in FCM.
H4b. Prior learning experience is positively associated with the perceived value of FCM.
H4c. Personalized learning climate is positively associated with perceived value in FCM.

Perceived quality and perceived value

We suppose that perceived quality in the flipped contexts has a positive effect on perceived value. Specifically, since perceived quality is measured by five first-order factors in the current research, perceived usefulness of the online course relates to the perception of the course content, and the dimension of ease of using the online course makes individuals feel that their time management is economical, both of which together have an influence on their perceptions of the learning efficiency of the online course. Prior research also supports that perceived ease of use and usefulness would positively relate to students' learning efficiency in blended settings (Teo, 2010). This deduction also applies to the learners' perceptions of using the online information platform. Moreover, in physical classes, collaborative learning among teachers and peers can efficiently promote students' achievement and co-construction of knowledge (Tsai, 2001). We thus propose that:
H5. Perceived quality is positively associated with perceived value in FCM.

Proposed FCM satisfaction model

Synthetically considering the above hypotheses, the experiential learning theory and the features of the flipped classroom, this research proposed personalized learning climate and prior learning experience as significant antecedents to predict learners' satisfaction; furthermore, perceived quality and perceived value were introduced to further explore their vital mediation mechanism in the proposed model (shown in Figure 1).

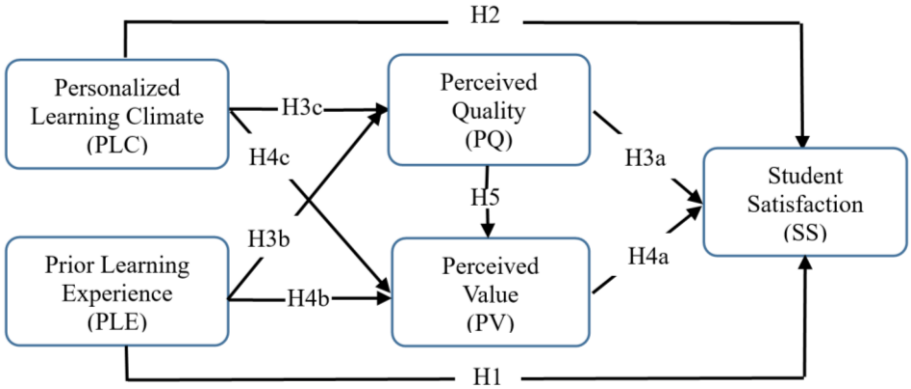


Figure 1. The hypothesized FCM satisfaction model

Methodology

Participants and procedure

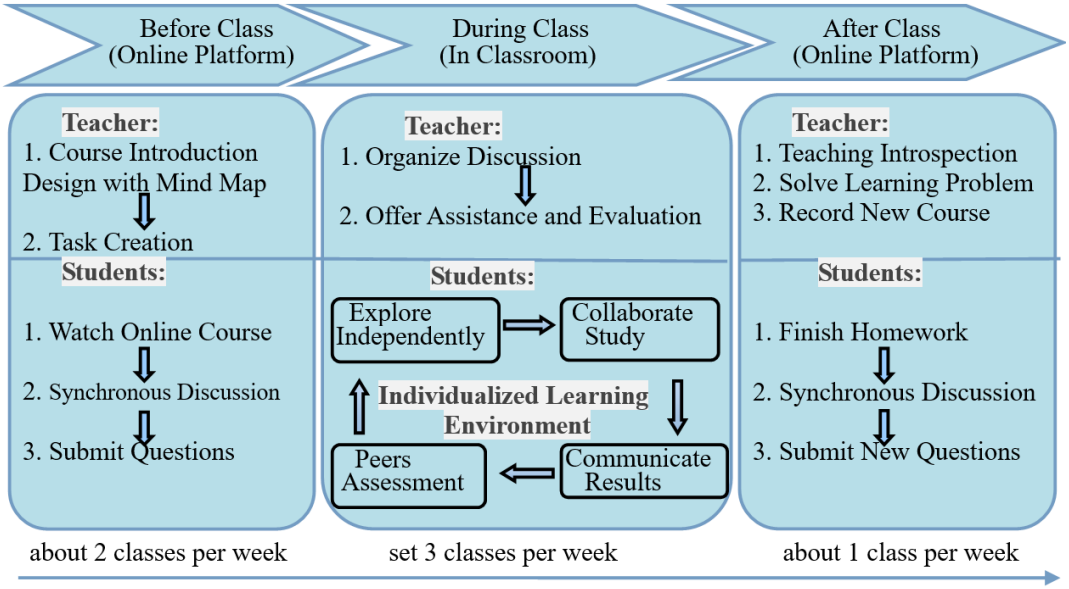
A total of 178 undergraduates participated in the Flipped English as Foreign Language (EFL) sample class at a target University in central Mainland China. The longitudinal survey methodology was used for collecting data. The measurements of Prior Learning Experience and demographic information were collected and coded before the beginning of the class; after the 32-week (2 semesters) FCM sample course, the participants were asked to complete the rest of the questionnaires. Totally 158 students answered the questionnaires anonymously, of which 146 valid questionnaires were utilizable since 12 responses were incomplete and had to be discarded, giving a valid response rate of 92.41% of the initial sample. Although the number of participants was limited, the results (shown in Table 1) of a chi-square test indicated that in terms of gender (p = .19), major (p = .24), grade (p = .11), and spending time online (p = .75), there were no statistically significant differences in the demographics, suggesting that this sample is relatively representative.

The current FCM teaching experiment was carried out from September 2013 to June 2014. Figure 2 shows that this course consisted of three parts (before class, in class and after class) with six 45-minute classes each week, which is in accordance with class periods in traditional settings. Three physical classes (40-50 students per class, 3 classes in total) were carried out at a set time and place each week, where the students were divided into groups (5-6 students per group in random) according to the seats settings in the physical classroom for the convenience of discussion, and online preview and revision took up the remaining three classes depending on the learners' personalized arrangement with the online learning platform (shown in Figure 3). The platform consisted of two basic learning functions: video platform and discussion platform. To increase the storage capacity, the lecture videos captured by instructors are uploaded to a popular video website You Ku, to which the URL was

linked to the platform. Besides, the discussion platform including BBS and online chat room are both designed for learners' convenient mind-exchanging.

Table 1. Demographic profile and results of chi-square test (n = 146)

Variables	Classification	Total (%)	χ^2 (Sig.)
Gender	Male	81 (0.55)	1.75(0.19)
	Female	65 (0.45)	
Major	Engineering	41(0.28)	4.19(0.24)
	Science	44(0.30)	
	Arts	29(0.20)	
	Others	32(0.22)	
Grade	Freshman	41(0.28)	6.06(0.11)
	Sophomore	32(0.22)	
	Junior	27(0.18)	
	Senior	46(0.32)	
Time Online (1 week)	<3h	33(0.23)	1.23(0.75)
	3-6h	42(0.29)	
	6-9h	36(0.25)	
	>9h	35(0.24)	



Totally 72 online classes and 72 face to face classes over 6 months

Figure 2. Procedure of the FCM trial class

Data analysis

Several statistical indices need to be considered when conducting data analysis. Cronbach alpha coefficients and composite reliabilities for all constructs were first examined using SPSS 19 to evaluate the internal reliability of the nine constructs. Then the correlation analyses were presented for examining the relationships between each construct. Furthermore, Structural Equation Modeling (SEM) conducted using AMOS 22.0 with the method of maximum likelihood estimation was applied to achieve the purposes of this study. As Stevens (2012) suggested, a suitable sample case when conducting CFA could be five to ten times of the total number of items in the surveying scales; the current survey with 146 cases satisfies this criterion. The structural model was tested by examining the relationships among the latent variables and detecting the fitness of the proposed models. Thus, SEM was considered to be an appropriate technique for the current study. Specifically, several model fit statistics were tested, including the ratio of chi-square to the degree of freedom, RMSEA (the root mean square error of approximation), CFI (comparative fit index), IFI (incremental fit index), and GFI (adjusted goodness of fit index). Besides, path coefficients were analyzed to test each hypothesis.

Figure 3. FCM learning platform and classroom designed for the current

Instruments

To guarantee the validity of the measurements, a large number of prior relevant studies were consulted to ensure that a comprehensive list of measurements was included, and appropriate instrument items could be employed from past studies. The instruments of Prior Learning Experience adapted from Bourgonjon, Valcke, Soetaert, and Schellens's (2010) research (loading: 0.52-0.88) investigated whether learners were experts in blended learning before the beginning of the FCM trial class. Additionally, three items modified from Paechter and Maier' s study (2010) were tapped to measure the students' perceived extent of Personalized Learning Climate in FCM. Perceived Value was measured with items adapted from Fornell et al.'s survey (1996), and in the FCM context, learners' consumed time rather than charged expense was considered as learners' "*cost*." To evaluate students' satisfaction with FCM, items comprehensively adapted from Chen, Lin, and Kinshuk's study (2008) (loading: 0.64, 0.88 respectively) and Wu, Tennyson, and Hsia's study (2010) (composite reliability coefficients: 0.957; the AVE: 0.849).

The perceived quality instrument including five factors was mainly adapted from prior relevant studies, which have indicated the satisfactory reliability of each factor. Items for perceived usefulness of the platform (UP) and ease of using the platform (EUP) were adapted from Tsai et al.' s work (2012), and the reliability (Cronbach's alpha) for UP and EUP were 0.84 and 0.93, respectively, indicating that these factors had sufficient reliability. Besides, Usefulness of the online course (UOC) and Ease of using the online course (EUOC) were measured with items from Sun et al.'s study (2008). The reliability of the measured items in Sun's study was respectively 0.87 and 0.83 for the UOC and EUOC. Additionally, the Interaction in physical classes (IPC) items in this survey were adapted from Paechter and Maier's study (2010) to investigate the students' evaluative standards in the situations of judging peers and instructor-pupil interactive effectiveness in a face-to-face classroom.

Four professors (two majoring in education technology and two in foreign language) validated the questionnaire items by individual review in paper-and-pencil format and group discussion when translating the content of the items into Chinese, and some items were consolidated and modified in response to the FCM context. Besides, a pilot survey was conducted with 10 students, then the format and content of the questionnaire were refined accordingly. Consequently, a total of 26 items presented with a 5-point Likert scale (from 1, "strongly disagree" to 5, "strongly agree") were administered to investigate the university students' satisfaction with the flipped EFL course.

Results

Correlation analysis

The means and standard deviations of each variable as well as their correlations are shown in Table 2. The "SS" was significantly and positively correlated with all of the variables, which provided initial suggestions of the relationship between "SS" and other variables. Specifically, the correlation between "SS" and "PLE," "PV" was relatively higher (r = 0.51, 0.58 respectively), while the correlation between "SS" and "PLC" was relatively lower (r = 0.37), suggesting that "PLE" and "PV" may play a more vital role in driving students' perceptions in FCM. However, there was no significant correlation between "PLC" and "PV," which generally indicated that in the flipped context the personalized settings may not directly relate to students' perceived value.

Table 2. Means, standard deviations and correlations of the research variables

Variable	Mean	*SD*	1	2	3	4	5	6	7	8	9
1.PLC	3.85	0.65									
2.PLE	3.61	0.68	0.25**								
3.PV	3.77	0.78	0.14	0.44**							
4.SS	3.79	0.74	0.37**	0.51**	0.58**						
5.EUP	3.58	0.71	0.26**	0.22**	0.25**	0.25**					
6.UP	3.72	0.64	0.21*	0.32**	0.36**	0.30**	0.22**				
7.EUOC	3.61	0.71	0.28**	0.39**	0.44**	0.38**	0.45**	0.34**			
8.UOC	3.61	0.71	0.30**	0.35**	0.44**	0.37**	0.34**	0.29**	0.52**		
9.IPC	3.56	0.72	0.24**	0.16*	0.34**	0.26**	0.31**	0.26**	0.39**	0.33**	

Notes. n = 146. $^{*}p < .05$, $^{**}p < .01$. Personalized Learning Climate (PLC), Prior Learning Experience (Baepler et al.), Perceived Value (PV), Student Satisfaction (Baepler et al.), Ease of using the platform (EUP), Usefulness of the platform (UP), Ease of using the online course (EUOC), Usefulness of the online course (UOC), Interaction in physical classes (IPC).

CFA analysis

Confirmatory factor analysis was performed to examine the measurement model of the FCM students' satisfaction index. According to Table 3, all of the factor loadings are greater than 0.50, and the t-values revealed significance at the 0.001 level, indicating a strong relationship with their associated constructs. Additionally, the Cronbach alpha coefficients for each scale ranged from 0.64 to 0.80 (overall alpha = 0.82), and each of the composite reliability values was above 0.50, which revealed the acceptable internal consistency of this questionnaire. The fitness indices of the measured items for the proposed model (the ratio of chi-square to degrees of freedom = 1.18, RMSEA = 0.035, GFI = 0.91, IFI = 0.96, CFI = 0.96) indicated an acceptable model fit. Meanwhile, the squared multiple correlation of Students Satisfaction presented in parentheses was 0.73, indicating a good examination of students' perceived satisfaction. Moreover, path analysis was employed to assess the structural model that specified the relations between the latent constructs. In sum, the above reliability and validity of the data coefficient showed that the measurement was acceptable.

Table 3. CFA analysis for students satisfaction questionnaire in FCM (n = 146)

Scale	Item	Loading	Alpha
	Ease of using the online course(EUOC) *Source: (Sun, Tsai, Finger, Chen, & Yeh, 2008)*	-------	0.63
	1 Learning to operate the online course system was easy for me.	0.62	
	2 Generally, I find that the online course system is easy to use.	0.81	
	3 It is easy to get the online course system to do what I want it to do.	0.62	
	4 It was easy for me to become skillful at using the online course.	0.72	
	Usefulness of the Online course (UOC) *Source: (Sun, Tsai, Finger, Chen, & Yeh, 2008)*	-------	0.73
	1 Taking the online course improved my effectiveness in the FCM program.	0.60	
	2 Using the online course in the FCM program enhanced my productivity.	0.72	
	3 I feel the usefulness of conducting flipped classes via the online course.	0.74	
Perceived Quality	**Ease of using the platform (EUP)** *Source:(Tsai, Hwang, Tsai, Hung, & Huang, 2012)*	-------	0.79
	1 It took only a short time to learn how to operate the FCM interactive system.	0.50	

	2 The design of the FCM platform interface fits users' operating habits.	0.60	
	3 It is easy and clear for me to search needed results in the FCM platform.	0.70	
	Usefulness of the platform (UP) *Source:(Tsai, Hwang, Tsai, Hung, & Huang, 2012)*	-------	0.63
		0.72	
	2 The use of the interactive platform enhanced my ability to search for information when problem-solving.	0.74	
	3 The use of the interactive platform made me have more interest in the course.	0.59	
	Interaction in physical classes (IPC) *Source:(Paechter & Maier, 2010)*	-------	0.73
	1 I can effectively exchange information in the FCM physical class.	0.66	
	2 I can get support from cooperative learning and group work with other participants in the FCM physical class.	0.74	
	3 I can easily get counseling and support by the tutor in the FCM physical class.	0.67	
Personalized Learning Climate (PLC)	*Source:(Paechter & Maier, 2010)*	-------	0.76
	1 I can decide on my own the time and pace for FCM learning.	0.69	
	2 It is flexible with regard to FCM learning strategies.	0.73	
	3 The flipped classroom model provides personalized learning support.	0.74	
Prior Learning Experience (PLE)	*Source:(Bourgonjon, Valcke, Soetaert, & Schellens, 2010)*	-------	0.64
	1 Compared to people of my age, I participate in a lot of blended learning activities（E-learning + face to face strategy）.	0.74	
	2 Compared to people of my age, I am in favor of participating in blended learning activities.	0.72	
Perceived Value (PV)	*Source:(Fornell et al., 1996)*	-------	0.80
	1 Compared with the traditional learning approach, I spend less time learning a certain knowledge point in FCM.	0.84	
	2 Compared with the traditional learning approach, I can learn more in a certain time in the flipped context.	0.79	
Students' Satisfaction (SS)	*Source:(Chen, Lin, & Kinshuk, 2008; Wu, Tennyson, & Hsia, 2010)*	-------	0.77
	1 Overall, I feel satisfied with flipped pedagogy.	0.65	
	2 I am satisfied that FCM meets my needs in terms of learning.	0.81	
	3 I would like to continually use the FCM in my learning.	0.74	

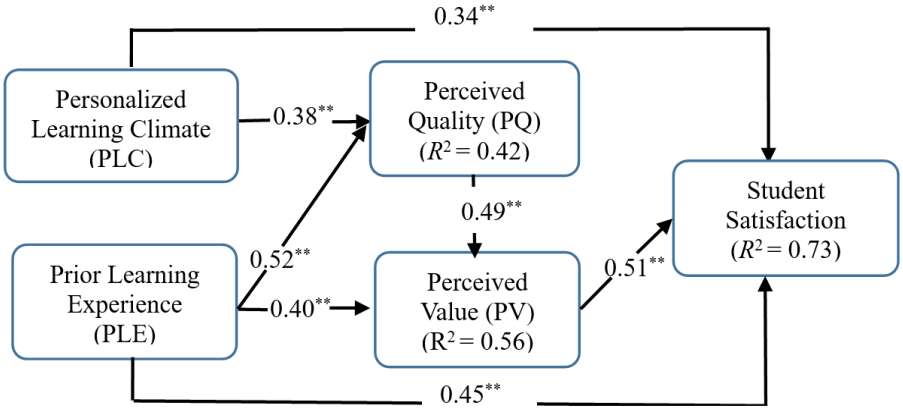
SEM analysis

The SEM standardized path analysis results for testing each hypothesis are shown in Figure 4. "Personalized Learning Climate" and "Previous Learning Experience" are positively associated with "Student Satisfaction" (path coefficient 0.34, 0.45, respectively, $p < .01$, $p < .01$, respectively), which confirms hypotheses H1 and H2. "Personalized Learning Climate" is positively associated with "Perceived Quality" (path coefficient 0.38, $p < .01$) which confirms hypothesis H3c. Besides, "Prior Learning Experience" has significant positive relationship with "Perceived Quality" and "Perceived Value" (path coefficient 0.52, 0.40 respectively, $p < 0.01$), which supports hypotheses H3b and H4a. "Perceived Value" is positively associated with "Student Satisfaction" (path coefficient 0.51, $p < .01$), which supports hypothesis H8. Furthermore, "Perceived Quality" significantly fosters "Perceived Value" (path coefficient 0.49, $p < .01$) which supports H5. Contrary to our predictions, "Perceived Quality" fails to directly predict "Student Satisfaction", and "Personalized Learning Climate" is not significantly related to "Perceived Value"; therefore, hypotheses H3a and H4b are unsupported.

Discussion

The results of this survey indicated that prior learning experience and personalized learning climate are both important antecedents to predict students' perceptions in FCM settings. Personalized settings allowing learners to work at their own pace are helpful for increasing student satisfaction, which is also consistent with Chow and Shi's (2014) argument.

Moreover, compared with the design of a personalized learning climate, learners' prior learning experience is a far more significant predictor of learners' favorable perceptions in the flipped context, and the efforts to strengthen learners' prior experience may be more "economical" and operable. Accumulated experience of blended learning fosters students' comprehension of learning procedures, benefits, and learning difficulties, it leaves learners with a clear judgment of their preference for creating student-centered instruction for themselves.



Notes. $^{**}p < .01$. Numbers in parentheses are squared multiple correlations.
Figure 4. The final model of structural relationships in FCM

Surprisingly, contrary to our hypothesis, personalized learning climate could not directly predict students' perceived value, and perceived quality completely rather than partially mediated personalized learning climate and perceived value. The possible explanation for H4c being unsupported may be the fact that the personalized climate in FCM provides learners with a free and personalized space. However, like a double-edged sword, in such a "free" climate, students' attention is easily distracted by computer games or online free chat, if the course quality is inadequate to attract them, and this is particularly so for those students whose autonomous learning capability tends to be relatively weak. Therefore, it is suggested that the superior course quality still plays a vital role in mediating the two factors.

Unexpectedly, the influence of perceived quality on student satisfaction is weak, indicating that perceived value is a complete mediator between perceived quality and students' satisfaction. The fact that H3a was unsupported highlights the fact that perceived quality was inclined to predict students' satisfaction through the mediator of "perceived value," which draws special emphasis on learning efficiency in FCM settings. Although learners could watch the videos repeatedly and speculate on any determined points, they might still feel stressed and confused. Because they failed to receive peers/teachers' definite responses instantly, until they attended physical classes a few days later. Thus, learners' perceived quality is necessarily related to their satisfaction through the complete mediator perceived value.

Conclusion

This study, based on ELT, adapted developed instruments and utilized SEM to empirically examine student satisfaction in a flipped classroom context. We believe that our theoretical development provides a step toward a better understanding of FCM effectiveness.

The findings of this research thus raise vital implications for FCM teaching and learning practice. First and foremost, the "pre-instruction" is of greater significance for learners' in-depth understanding of FCM design and procedure. Thus a series of warm-up activities as "rehearsals" are suggested carrying out for students' comprehension of their mission before/in/after the class, which is followed by learners' favorable perception of their self-confidence, interest points and learning controllability. Specifically, instructors should offer opportunities for learners to observe the flipped procedures at least through viewing some demonstration video on flipped learning to help learners fully understand the FCM procedures and practices before the start of the formal course. Some training classes concerning the usage of the online platform ought to be performed to illustrate the details of using the platform. Besides, according to the scale of PLE, learners' previous learning experience has potential relationship with their preference of the blend learning model. Therefore, instructors have to take learners' individual difference into consideration when conducting FCM. For instance, it can be adaptive for meeting the needs of students with difference levels of maturation or preferences for blended learning methods. Finally, considering perceived value is conducted as a complete mediator in the satisfaction

model, some intelligent techniques available for enhancing learning efficiency, such as instant online chat apps, intelligent agents, are strongly suggested being utilized when designing the online learning platform for flipped learning.

Although a rigorous validation procedure was conducted to develop a general instrument for measuring FCM satisfaction, this research still suffers from the limited sample and course type in the current survey, since flipped pedagogy is still in its infancy in China. To deepen our understanding of students' perceptions, future research is therefore warranted to analyzing factors considering the distinction of course types and learners' personality with the growing popularity of flipped pedagogy.

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