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RESEARCH ARTICLE

The Influence of Teaching Presence on Students Satisfaction toward MOOC Based Flipped Classroom

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ABSTRACT

Student satisfaction plays a crucial role in ensuring effective flipped learning. This study designed a flipped "Fundamentals of Computer Application (FCA)" course based on Chaoxing MOOC platform and investigated 442 students' satisfaction with the model and the relationship between teaching presence and students satisfaction. The results showed that student satisfaction with the model was high (M = 19.37, SD = 2.694, total 129 in the affective coding, of which 79 were positive and only 2 were negative), and that the three dimensions of Teaching Presence(TP), Instructional Design and Organization(IDS) ($r = 0.410$, $p < .001$), Facilitated Discourse (FD) ($r = 0.355$, $p < .001$), Direct Instruction (DI) ($r = 0.362$, $p < .001$) were all positively and significantly related to satisfaction, with Instructional Design and Organization(IDS) ($\beta = .239$, $t = 4.555$, $p = < .001$) , and Direct Instruction (DI) ($\beta = .218$, $t = 2.468$, $p = < .05$) were able to significantly predict satisfaction. The findings indicated that students are highly satisfied with the flipped model in the FCA course, which is mainly practical and hands-on. Consequently, teachers should carefully plan and organize their lessons, give students direct guidance when needed, foster a safe learning environment, and provide more opportunities for students to give speeches. All of these strategies will contribute to students' increased satisfaction with flipped learning.

Contribution/Originality: This study is one of the very few studies that have investigated the relationship between teaching presence and student satisfaction in the flipped classroom, demonstrating that two dimensions of teaching presence, Instructional Design and Organization and Direct Instruction, are significantly related to student satisfaction.

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1. Introduction

The flipped classroom is a novel approach tha the usual teaching and learning activities that take place both inside and outside of the classroom are turned around. It combines online and in-person learning activities. Students watch instructional videos before the course to gain a basic understanding of the material, and the teacher leads them in a series of problem-solving exercises in the classroom (Sointu et al., 2023). As traditional face-to-face knowledge delivery is shifted to out-of-class time, this allows teachers to spend more classroom time observing and understanding their students, identifying deficits in student learning, and thus helping them to fill knowledge gaps, correct misperceptions, and provide more timely guidance (Baig & Yadegaridehkordi, 2023). A number of research have focused on flipped pedagogy in recent years (Sointu et al., 2023). Furthermore, MOOC materials have been created globally, providing the groundwork for the successful adoption of a flipped classroom (Wang et al., 2022).

Previous researches have focused on the integration of flipped classroom strategies such as active learning, collaborative learning, problem-solving , games, etc., to carry out the learning outcomes of courses using flipped classrooms, such as improved learning outcomes , engagement, self-learning , teamwork , and communication skills (Baig & Yadegaridehkordi, 2023), in comparison to traditional teaching (Awidi & Paynter, 2019), etc. Bosch Farré et al. (2024) investigated 16 items of student satisfaction regarding the flipped classroom, of which 12 reported positive satisfaction, indicating a high level of student satisfaction with this method. However, these studies on satisfaction mainly focused on the interactivity, motivation, and acceptance of the flipped classroom. As found in a systematic review by Sointu et al. (2023), factors such as instructor's pedagogical skills, timely guidance and support, clear structure of the learning materials, and clear organization of the learning activities are essential to increase student satisfaction and enhance the experience. Teaching Presence (TP), a key element of the community of inquiry model (COI), is a well-liked metric for gauging these ideas (Garrison & Arbaugh, 2007). In flipped learning, TP is crucial (Kay et al., 2019). In order to better design a flipped classroom, the study aimed to gain a deeper understanding of the critical elements for success in the flipped classroom from the perspective of TP in the COI framework.

2 Literature review

2.1. Flipped classroom

A flipped classroom is not a set model. The core idea is that students watch a video created by the instructor before class and the classroom becomes a place to solve problems, engage in writing learning, advance concepts, and maximize instructional time (Baig & Yadegaridehkordi, 2023).

However, the flipped classroom cannot be seen as just a simple rearrangement of activities; It emphasises the dynamic guiding role of the teacher, pre-class preview materials and collaborative student-centered learning activities in a face-to-face classroom that by its nature offering a wide range of possibilities for making full use of technologies to support learning (Sointu et al., 2023). In order to employ various teaching tactics more effectively in the flipped classroom and help students learn more quickly and meaningfully, teachers must evaluate the learning objectives and content based on the unique qualities of the subject (Baig & Yadegaridehkordi, 2023). In the

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flipped classroom, teachers need to be able to not only teach specialized course knowledge, but also to be able to create learning contexts that promote collaborative learning activities and support students with diverse learning needs (Sointu et al., 2023). Meanwhile, Bishop and Verleger (2013) point out that the value of the flipped pedagogy is not only in the conversion activities, but also in the completion of a range of additional tasks both inside and outside the classroom (e.g., problem solving in groups, answering questionnaires, and hands-on practice).. Teachers can use these activities to update lecture material based on student misunderstandings or areas for improvement (Moravec et al., 2010). Furthermore, educators must utilize this data to give students relevant feedback, which is well-known to be essential for determining students' satisfaction levels and for evaluating their learning styles (Sointu et al., 2023).

Further, clear scheduling of activities is also crucial in the flipped classroom. Having a clear understanding of instructional activities and scheduling in flipped learning enables students to quickly adapt to this new format, allowing them to complete learning tasks more efficiently and increase satisfaction (Mason et al., 2013). Clearly structured learning materials can enhance students' perceptions of the classroom and their participation in the educational process (Baig & Yadegaridehkordi, 2023).

2.2. Teaching Presence (TP)

According to Kay et al. (2019), TP is an important factor in students' cognitive development when implementing a flipped classroom. TP is a dimension of the community of inquiry framework as "designing, facilitating, and directing cognitive and social processes to achieve personally meaningful and educationally valuable learning outcomes", which includes three sub-dimensions: Instructional Design and Organization (IDS), Facilitated Discourse (FD), and Direct Instruction (DI) (Garrison & Arbaugh, 2007). These three dimensions are defined as shown in Table 1.

Table 1: Definition of the three sub-dimensions

Category	Definition
IDS	Making decisions about course planning and design; adjustments while the course is in progress; and interaction and evaluations procedures.
FD	Associated with sharing meaning, identifying areas of agreement and disagreement, and seeking to reach consensus and understanding
DI	Facilitate reflection and discourse by presenting content, using various means of assessment and feedback.

Source: Garrison & Arbaugh (2007)

According to the framework, TP plays a key role in the implementation of the flipped classroom by connecting students and teachers who are not physically connected. Specifically, from the perspective of TP, teachers preprocess the implementation of the flipped classroom by designing instructional processes, developing instructional videos, and creating discussion tasks. During the implementation process, the teacher not only facilitates interactions between students and learning materials, peers, and the teacher, but also provides timely feedback, and monitors and guides discussion activities. From this theoretical perspective, pedagogical preprocessing seems to be related to learner engagement in flipped learning (Ay & Dağhan, 2023).

Empirical evidence shows that teachers are crucial to the success of flipped courses (Strelan et al., 2020; Limniou et al., 2018; Le Roux & Nagel, 2018). For example, Limniou

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et al. (2018) based on a survey of first-year psychology students found that students were positive about teachers' ability to develop or find learning materials that increase students' motivation to learn, and had a high level of satisfaction with teachers' ability to motivate, encourage, and guide students to engage in discussions around topics and develop higher-order skills. Le Roux and Nagel's (2018) findings further marked that TP not only informs learning in individual and collaborative spaces for flipped learners, but also assists students in accomplishing integration of cognitive presence and problem solving during online video conferences or classroom seminars. However, researchers have paid little attention to TP in the flipped classroom, and although researchers have examined the perceptions and satisfaction of flipped classroom learners, they have failed to make a connection between TP and satisfaction. Thus, it is unknown whether TP affects flipped learners' satisfaction.

2.3. Satisfaction

Satisfaction is a basic indicator of whether learners perceive positive value in the flipped learning experience (Kim et al., 2021). In a meta-analysis of 114 studies, Strelan et al. (2020) discovered that the flipped classroom can give students the chance to learn in a flexible and active way, promoting self-regulation and self-directed learning. It can also make better use of instructional time and improve in-class practice. Thus, students have positive satisfaction with the course during the flipped classroom learning experience. However, there are some studies that have been shown to yield opposite results. Students were less satisfied with the flipped classroom approach than with the other two approaches, according to Missildine et al. (2013), who compared the traditional lecture only, lecture and lecture capture back-up, and the flipped classroom approach using a quasi-experimental design. Missildine et al. (2013) suggested that teachers must improve the ways in which they carry out the flipped classroom in order for students to embrace this novel teaching strategy. Students in a focus group discussion admitted that they preferred the traditional classroom to the flipped classroom (El-Banna et al., 2017). In conclusion, a large body of literature has examined student satisfaction in flipped classrooms; however, there is some debate about whether or not there is satisfaction with flipped classrooms. Meanwhile, fewer studies have explored the impact of the three different elements of TP on student satisfaction in the flipped classroom. Whereas, research has shown that TP significantly predicts student satisfaction (Caskurlu et al., 2020). Garrison and Cleveland-Innes (2005) argued that teacher-learner interactions have a greater impact on learner satisfaction than interactions between learners.

Thus, TP leads to effective learning, which is facilitated by direct contact with the teacher and optimal guidance. Given that the link between TP and student satisfaction in the flipped classroom is weak in the literature, in order to fill this gap, the purpose of this study was to investigate the relationship between student satisfaction and TP in the flipped classroom, and more specifically, the following research questions were explored:

i. Are students satisfied with the flipped classroom?
ii. What is the relationship between the dimensions (IDS, FD, and DI) of TP with students satisfaction in the flipped classroom?
iii. Which dimensions (IDS, FD, and DI) of TP have more impacts on student satisfaction in the flipped classroom?

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3. Method

Data for this study were gathered using both quantitative and qualitative techniques. The effectiveness of the course was measured through a questionnaire and an analysis of the content of the students' course comments. Sentiment coding, word cloud mapping, descriptive statistics, correlation analysis and multiple linear regression analysis were used to present the findings.

3.1. Participants

Participants in this study included 505 freshmen in the FCA course in the fall semester of 2023 at the Faculty of Intelligent Engineering, S University. During the course, three students were sick for a long period of time and could not participate in most of the course activities, including the questionnaire survey.

3.2. Instructional Design

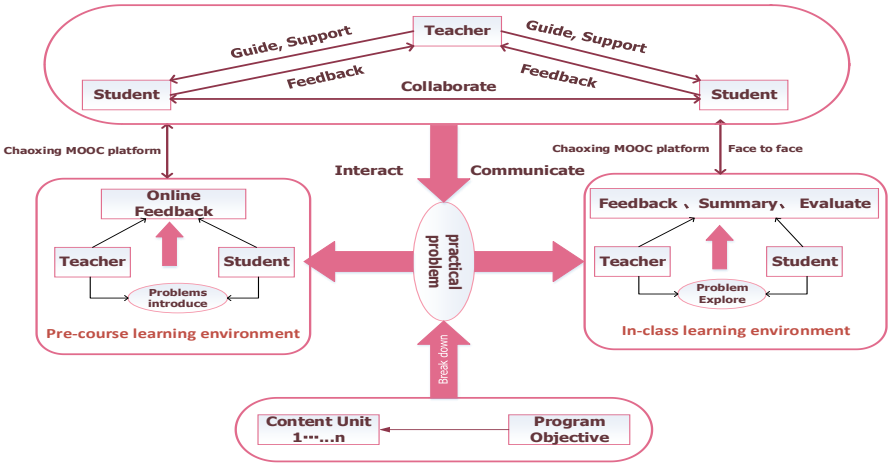
FCA is a 3-credit course offered in Fall 2023 at the Faculty of Intelligent Engineering, S University, Henan, China. The course meets twice a week for 8 weeks for 45 minutes. The course is a technical practice course with strong application, which is mainly divided into four topics: computer basics, Microsoft Office software, computer networks, and computer programs, and requires students to be able to apply computer-related knowledge in real-world scenarios, exercise their office skills, programming thinking, and achieve problem solving (Zhang et al., 2008).

Kardipah and Wibawa (2020) argued that the content of a FCA course is procedural in nature and therefore suitable for the flipped classroom approach. This study modified Kardipah and Wibawa's (2020) flipped blended learning model by using the Chaoxing MOOC platform as a technological support, designing a problem-based teaching and learning process, which refines the overall teaching objectives into unit subobjectives, then transforms the unit objectives into executable, easy-to-operate and evaluation-friendly sub-problems provided to students, and finally returns to the corresponding unit objectives through the rounding and sorting of the sub-problems to realize the overall teaching objectives.

The model creates two teaching environments before and during the class. Before class, teachers create corresponding learning materials, including courseware, teaching videos, quizzes, etc., according to the set sub-problems, and upload them to the Chaoxing MOOC platform for students to study flexibly according to the teaching arrangement. When students encounter some difficulties in conceptual understanding and application in preclass learning, teachers should give timely feedback and build the necessary scaffolding for students to solve problems in terms of student participation, learning and interaction (Long et al., 2017). In the classroom, the teacher focuses on the difficult problems encountered by the students in their pre-course study, and then proposes well-designed questions and solves the problems by means of quizzes, questions, and thematic discussions (Figure 1).

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Figure 1: Structure of flipped classroom model based on Chaoxing MOOC platform



Source: Kardipah & Wibawa (2020)

3.3. Data Collection Tools

TP was measured using an instrument developed by Swan et al. (2008) and translated into Chinese. The instrument consists of 13 questions, with items 1-4 surveying students for the IDS component, items 5-10 surveying students for the FD component, and items 11-13 surveying students for the DI component. The higher the score on the 5-point scale, the greater the sense of teaching and learning experience. The instrument is reliable with a Cronbach's α of 0.94 (Swan et al., 2008) and in this study the Cronbach's α measured using SPSS was 0.936.

Satisfaction was measured using the variable "satisfaction with the flipped classroom" created by Sointu et al. (2023). The main focus of the survey was on the overall operation of the flipped course, the effective integration of pre-course materials and face-to-face instruction. The instrument consisted of five questions designed on a five-point Likert scale (Strongly Disagree = 1, Disagree = 2, Remain Neutral = 3, Agree = 4, Strongly Agree = 5), whereby the subjects evaluated the degree of agreement with the descriptive questions on a five-point scale, with all questions being positively scored. Its Cronbach's α measured using SPSS was 0.89 (Sointu et al., 2023), and in this study it was 0.81.

3.4. Data collection and analysis

In the first session, the instructor introduced the process and requirements for implementing a FCA course based on Chaoxing MOOC. The course review data on the Chaoxing MOOC platform was collected as qualitative data, and the Nvivo software was used to recognize the sentiment of the students' course review data and to draw word clouds to answer the questions 1. One week following the course's conclusion, in December 2023, the formal survey was collected. The TP and Satisfaction questionnaires were disseminated via the Wenjuanxing platform, a commonly used online survey platform in China for data collecting. Out of the 502 surveys that were gathered, 442 of them were deemed valid, yielding an 88% validity rate. The SPSS/WIN 22.0 application was used to examine the quantitative data that were gathered. The significance level was 0.05. To answer question 2, its correlation was determined using

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Pearson's correlation coefficient, and to answer question 3, multiple regression analysis was used to confirm the impact of TP on learning satisfaction.

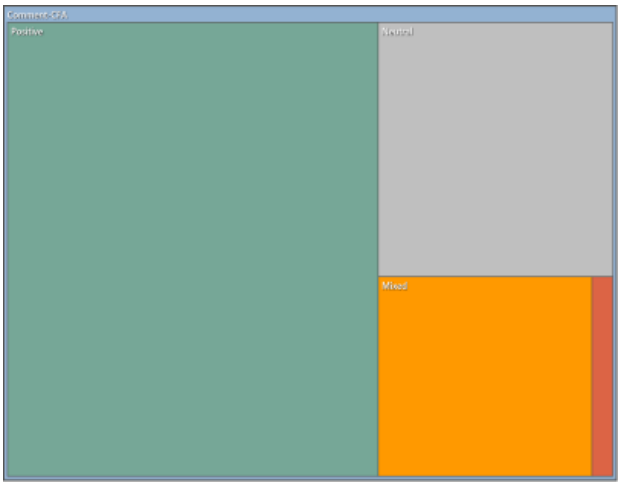
4. Result

4.1. Qualitative Data

In this study, the data of students' comments on this course on the Chaoxing MOOC platform were exported and analyzed. A total of 120 comments were collected on the course platform, and the author used NVivo 12 Plus for sentiment recognition and tag cloud mapping of the comment content, and the results are shown in Figure 2 and Figure 3, respectively.

As can be seen in Figure 2, positive emotions occupy the vast majority of the total number of emotion coding points of 129, of which 79 are positive emotions and only 2 are negative emotions, indicating that the students' learning emotions for this course are positive, and their overall satisfaction with the course teaching is high.

Figure 2: Sentiment coding for course comments



Note: Green-Positive; Gray – Neutral; Orange-Mixed; Red-Negative

Figure 3: Word cloud of course comments



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In this study, students' course evaluations of the flipped classroom teaching method based on the Chaoxing MOOC platform are presented through a 1-tag cloud to quickly highlight the most salient keywords in their responses. As can be seen in Figure 3, there are two distinct categories of words with the highest repetition rate. The repetition of the words "teaching", "practice", "curriculum", "understanding", "knowledge" and "content" indicates that students appreciate excellent instruction and understand how the flipped classroom model benefits their learning and helps them get higher grades. The second tier of words ("engaging," "atmosphere," "fun," "enriching," "responsible") indicates that even though students were unfamiliar with this instructional design, they recognized that this student-centered instruction had several positive and engaging, such as learning climate, problem solving, and questioning. In summary, students were pleased with the pedagogical outcomes of the "flipped classroom" design and appreciated its novelty. They were also able to recognize and accept the design.

4.2. Quantitative Data

4.2.1. Descriptive statistics

This study collated 442 freshmen of the Faculty of Intelligent Engineering (Table 2), 215 males and 227 females. 95.7% of the students were in an online environment that could support online learning, with a computer skill of 2.38±0.984 (Total score of 5). 44.6% of the students spent more than 4 hours on the internet, and only 5.9% of the students spent less than 1 hour. Overall, the students who participated in the study had the ability and capacity to participate in flipped classroom learning.

Table 2: Demographic characteristics of participants and the internet experience (n = 442)

		Frequency	Percent	Cumulative Percent	M (±SD)
Gender	Male	215	48.6	48.6	1.51 (±0.500)
	Female	227	51.4	100	
Computer skills	Poor	87	19.7	19.7	2.38 (±0.984)
	Good	156	35.3	55	
	Better	157	35.5	90.5	
	Very good	26	5.9	96.4	
	Excellent	16	3.6	100	
Whether the network environment supports online learning	Yes	423	95.7	95.7	1.04 (±0.203)
	No	19	4.3	100	
Network time spent	1 hour	26	5.9	5.9	3.90 (±1.224)
	1-2 hours	35	7.9	13.8	
	2-3 hours	95	21.5	35.3	
	3-4 hours	89	20.1	55.4	

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	More than 4 hours	197	44.6	100

4.2.2. TP and satisfaction levels

Students had high levels of perceived TP and satisfaction in the MOOC-based flipped classroom (Table 3). Specifically, the mean value of IDS was 23.48±3.681 (Total score of 30), the mean value of FD was 22.58±4.093 (Total score of 30), and the mean value of DI was 11.14 ±2.211 (Total score of 30) and Satisfaction was 19.37±2.694 (Total score of 30).

Table 3: Level of TP and learning satisfaction (n = 442)

Characteristics		Number of Item	M (±SD)	Min–Max
TP	IDS	6	23.48(±3.681)	12-30
	FD	6	22.58(±4.093)	7-30
	DI	3	11.14(±2.211)	3-15
Satisfaction		5	19.37(±2.694)	6-25

Note: TP=Teaching presence, IDS=Instructional Design and Organization, FD=Facilitated Discourse, DI=Direct Instruction

4.2.3. Correlation analysis

The results of the correlation analysis showed that all three components of TP (IDS, FD, and DI) had a significant positive relationship with student satisfaction (Table 4). Of these, IDS ($r = 0.410$, $p < .001$) was positively related to student satisfaction, the FD ($r = 0.355$, $p < .001$) component was positively related to student satisfaction, and the DI ($r = 0.362$, $p < .001$) component was positively correlated with student satisfaction. Thus, higher TP was associated with higher learning satisfaction.

Table 4: Correlation between research variables (n = 442)

	IDS	FD	DI
Satisfaction	.410**	.355**	.362**

** Correlation is significant at the 0.01 level (2-tailed).

4.2.4. Multiple linear regression analysis

From the multiple linear regression model (Table 5), it can be seen that the VIF (Variance Inflation Factor) is between 2.76 and 4.152 which is below the critical value of 10, indicating that the model does not suffer from the problem of multicollinearity. The error terms' acceptable independence is indicated by the Durbin-Watson statistic of 2.059, which is near to 2.00 (Lai, 2021).

Multiple linear regression yielded a significant model (Adj. $R^2 = .176$, $F = 32.375$, $p < .001$). An examination of the beta weights indicated the IDS ($\beta = .239$, $t = 4.555$, $p = < .001$) and DI ($\beta = .218$, $t = 2.468$, $p = < .05$) of TP significantly influenced satisfaction. However, the FD portion of the TP ($\beta = -.032$, $t = -.553$, $p = .581$) had no significant effect on student satisfaction.

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Table 5: Multiple regression analysis on satisfaction (n = 442)

			β	SE	t	p	VIF
Independent variables	TP	IDS	0.239	0.053	4.555	<0.001	2.76
		FD	-0.032	0.058	-0.553	0.581	4.152
		DI	0.218	0.088	2.468	0.014	2.816
Adj. R2	0.176						
F	32.375***						
Durbin-Watson	2.059						

5. Discussion

This study designed a flipped classroom structure based on the Chaoxing MOOC platform and implemented it in a private applied undergraduate university in Henan Province, a mixed-methods study targeting freshmen students in the College of Intelligent Engineering, with the aim of understanding student satisfaction with the model and the relationship between TP and satisfaction in flipped teaching. By analyzing the student course comment data and satisfaction levels, it can be seen that students have a high level of student satisfaction with the flipped classroom, a finding that is consistent with other studies (Strelan et al., 2020). Teachers incorporating MOOC technology in the implementation of flipped classrooms require significant efforts to design and create videos and exercises, debug the MOOC platform, and provide feedback and personalized learning suggestions (Muñoz-Merino et al., 2017). And these efforts provide a student-centered learning environment with out-of-class learning content and resources that complement classroom teaching activities, help students understand and master important and difficult knowledge, and bring a better learning experience to students. At the same time, teachers supervise and guide students' learning progress based on the learning data of the MOOC platform, which increases teacher-student interaction and is also recognized by students (Wang et al., 2022).

The findings are consistent with other research that highlights the critical role that teachers play in the flipped classroom (Sointu et al., 2023). The flipped classroom necessitates a larger degree of self-directed learning for students used to traditional teaching methods, and they could be reluctant to this kind of change (Sointu et al., 2019). Therefore, it is necessary for teachers to provide more support and clear guidance during students' flipped learning process (Sointu et al., 2023), and research by Awidi and Paynter (2019) has also demonstrated how students' successful access to the resources and information needed to complete the course, clarity of the learning activity tasks and requirements, and teachers' provision of timely feedback to students on their assignments and the pointing out of common misunderstandings can effectively help students to better understand the content and to participate in the classroom activities effectively. Second, maintaining students' interest in pre-course materials is the primary obstacle to successfully implementing a flipped classroom (Pattanaphanchai, 2019). Therefore, teachers need to expand on the flipped model and incorporate innovative strategies to increase student engagement, such as gamification , technological tools , pre-class instructional guides or mind maps, timely feedback, and scaffolding (Long et al., 2017), designing highly structured classroom activities (Kay et al., 2019), and so on.

In correlation analysis IDS,FD,DI were significantly related to satisfaction but in regression analysis, IDS, DI significantly predicted satisfaction but FD did not have a significant effect on satisfaction which is inconsistent with the findings of Ondrey

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(2017). This may be due to sample differences. It is a common that East Asian students are reluctant to take the initiative to speak (Lee & Ng, 2010). Lee and Ng (2010) study showed that teacher's instructional strategies are the main determinants of students' reticence in the classroom. When implementing collaborative, discussion interactions in flipped teaching, teachers should create a safe learning atmosphere for students to be more willing and courageous to actively participate in learning activities (Sointu et al., 2023), as well as create more communication opportunities for students, such as idea sharing, questioning group presentations, debates, role-playing, etc.

6. Recommendations

The relationship between student satisfication and the three sub-dimensions of TP in the flipped classroom was first investigated in this study using both quantitative and qualitative data analysis techniques. Although the sample size of this study met the analysis requirements, it was a non-probability purposive sample with participants from a private undergraduate applied university in Henan Province, and the results cannot be generalized to other universities or populations. Future studies can expand the sample population to improve the validity and applicability of the findings. Meanwhile, some studies have found that certain demographic characteristics (i.e., gender, age, and academic level) affect students' perceptions of their sense of community (Choy & Quek, 2016). Garrison and Arbaugh (2007) argued that there is value in using large-scale studies to explore gender differences in sense of presence. Subsequent studies could incorporate additional variables to explore the extent to which the relationship between students' sense of presence and satisfaction with instruction is moderated by demographic variables, and, importantly, to gain a deeper understanding of how the flipped classroom varies across gender, age, and academic level as well as how these characteristics are differentially associated across gender, age, and academic level. Furthermore, this study may have overlooked significant determinants of satisfication with the flipped classroom, such as cognitive load, self-determination, and motivation. Therefore, future research should consider the factors that were not included in order to more fully understand student satisfaction with the flipped classroom.

7. Conclusion

Based on an analysis of the current flipped classroom teaching approaches, this study adopted the fundamental design principles of the model, created a "problem-centered" model applying to an FCA course, and investigated the students' satisfaction with the teaching method using a mixed research methodology and the relationship between TP and satisfaction. The results of this study show that students satisfaction with the flipped learning is high, and thus the MOOC-based flipped classroom teaching model is suitable for the design and implementation of a new teaching model based on the characteristics of practical courses, combined with the flipped classroom design idea, which has a certain degree of feasibility. Meanwhile, throughout the course, teachers should carefully design and organize teaching and provide direct guidance to students' learning, create a safe learning atmosphere and increase students' speaking opportunities, which help to improve students' satisfaction with flipped teaching. In conclusion, this study highlights the need for future studies with larger sample sizes and the inclusion of more variables in order to provide more comprehensive insights into the effective implementation of the flipped classroom.

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Ethics Approval and Consent to Participate

All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee.

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Conflict of Interest

The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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