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Abstract

This research paper aims to investigate the significant factors that influence the use of flipped classrooms at the Chengdu Vocational University of Art among undergraduate students. The research framework considers the causal relationships between knowledge, skills, task orientation, behavioral engagement, active learning, and satisfaction. In terms of research design, data, and methodology, the study used a quantitative research method (n=502) to survey undergraduate students who experienced the flipped classroom mode. The sampling methods included judgmental, quota, and convenience sampling. The data analysis included structural equation modeling (SEM) and confirmatory factor analysis (CFA) for model fit, reliability, and construct validity. The results indicate that knowledge, skills, task orientation, and active learning significantly impact satisfaction, with task orientation having the strongest impact. The authors recommend that academic administrators and teachers provide evaluations to measure the level of influence factors and student development and enhance undergraduate students' satisfaction. The paper provides insights into the factors that influence the effectiveness of flipped classroom learning, which can help educators improve student learning outcomes and satisfaction.

Keywords: Flipped Classroom, Student Satisfaction, Task Orientation, Behavioral Engagement, Active Learning

Introduction

Information technology has been continuously integrated and developed in education, and universities have begun to innovate teaching by leveraging information technology. This approach helps to diversify teaching methods, enrich teaching content, optimize teaching evaluation, and achieve teaching goals more effectively (Phiakoksong et al., 2022), thereby improving the quality of classroom teaching and overall educational outcomes. Additionally, it meets university students' differentiated needs and internal value demands (Wang et al., 2022).

Many universities have actively explored new teaching modes and methods to transform traditional classrooms (Zhu, 2020). The globally popular "flipped classroom" teaching model has entered Chinese universities and has been widely loved and paid attention to by teachers and students (Lou & Li, 2017). The flipped classroom has broken through many of the limitations of traditional teaching and is favored by universities across China (Dong et al., 2017). Zhang et al. (2022) believe that introducing the flipped classroom teaching mode in universities can cultivate students' interest in active learning, develop their spirit of active participation, and enhance their ability to discover and solve problems. This provides a useful reference for research on teaching reform.

From the perspective of the breadth of knowledge and the knowledge system of college students, the flipped classroom has played a creative and crucial role (Tang & Kang, 2021). Furthermore, the flipped classroom has a clear task orientation and structure, encouraging active student participation and fostering a more open approach to innovative teaching methods.

Skills are crucial for university students. Skill-based education methods are based on abilities and can promote the long-term retention and transfer of knowledge and skills (Bloom, 1973). Street et al. (2015) conducted a meta-analysis of 11 randomized controlled trials in undergraduate nursing education, which showed that the scores for theoretical knowledge and skills in the flipped classroom were significantly higher than those in the traditional classroom. Flipped classroom helps teachers to complete a "student-centered" teaching process, which can improve the overall satisfaction level of students (Guan, 2012).

This article constructs a research framework based on knowledge, skills, task orientation, and active learning as important factors affecting undergraduate students' Satisfaction with flipped classrooms. Among them, knowledge and skills may influence students' attitudes toward Satisfaction, as the lack of knowledge and skills can lead to employment difficulties (Lu et al., 2005). In addition, students active learning is also an issue that needs to be addressed in the teaching process of teachers (Fu, 2018). Therefore, the conceptual framework of this study includes six variables: knowledge, skills, task orientation, active learning, behavioral engagement, and satisfaction, to explore further the factors that influence undergraduate students' Satisfaction with flipped classrooms.

Literature Review

Flipped classrooms have emerged as a transformative pedagogical approach that promotes active student engagement and enhances learning outcomes. In this context, understanding the factors that influence the use of flipped classrooms becomes crucial for educators and institutions seeking to optimize instructional practices. This research paper aims to investigate the significant factors that influence the use of flipped classrooms at the Chengdu Vocational University of Art among undergraduate students.

Knowledge

Knowledge has a variety of definitions. It is the sum of human exploration of the material and spiritual world. People must verify, correct, and believe it (Zalta et al., 1995). Knowledge is a fundamental aspect of education and learning, and it is through the acquisition and application of knowledge individuals can understand and interact with the world around

them (Yao, 2010). Under the flipped classroom teaching model, students' active learning can integrate knowledge through homework and course presentations. Through online platforms, teachers can communicate with and guide students (Li, 2015).

Flipped classroom teaching mode challenges traditional teaching methods and promotes students' active learning and critical thinking toward knowledge (Kellesarian, 2018). Morice et al. (2020) found through their research that knowledge learning and acquisition are related to satisfaction under different teaching methods. Through surveys and research, Liu et al. (2017) found that knowledge learning, learning engagement, and learning outcomes are all related to satisfaction among college students. Therefore, we propose that:

Hypothesis 1: Knowledge has a significant influence on satisfaction.
Hypothesis 2: Knowledge has a significant influence on skills.

Skills

Skills refer to a way of physical or intellectual activity that an individual has developed through practice by applying existing knowledge and experience (Qin, 2002). Skills are a way of acting or intellectual activity learned and developed through practice, different from instinctive behavior. Skills refer to the cognitive activities learned following the law through learning (Lin, 2007).

In education, students' mastery of knowledge and skills and obtaining high scores may indicate a correlation with their ability to analyze and solve problems (Qin, 2002). Mastering knowledge can help to form skills (Zhu, 2020). In vocational education at the university level, knowledge and skills are interrelated, and school administrators ensure the coordinated development of student's knowledge and skills from multiple perspectives (Dai et al., 2005).

Some scholars believe that skills are a strong foundation for a country and profession, and skills emphasize the logic of skill development: initial proficiency, skilled practical wisdom. In this way, individuals can continuously improve their skills, become supervisors of the production or service professions they are engaged in, and establish their careers. Training skilled talents has always been a social issue of ongoing concern (Dreyfus, 2001; He, 2014). Feng et al. (2022) found through a survey on university graduates' employment that maintaining and improving satisfaction relies on the support of graduates' skills (Qiao et al., 2011). Hence, a hypothesis is suggested:

Hypothesis 3: Skills have a significant influence on satisfaction.

Task Orientation

Task orientation is a psychological term that emphasizes personal effort and a goal-oriented mindset toward mastering skills and completing tasks (Zhang, 2002). Moran (2004) believed that task orientation as a learning goal is to master motor skills, improve personal performance, emphasize comparing with one's past to establish performance standards, and pay attention to personal effort. In vocational education, task orientation can help students focus on and develop their career abilities during teaching (He, 2013).

Dweck and Sorich (1999) found that individuals are more likely to have positive self-affirmation when they feel that putting in the effort is a meaningful experience and are willing to accept task-oriented goals. Task orientation and satisfaction in teaching have a positive significance on the growth of mental health (Yu, 2004). Sun and Li (2011) found through their

study of 446 valid samples that interactive-oriented interaction and task-oriented interaction have a positive impact on customer satisfaction. According, this study develops a hypothesis:

Hypothesis 4: Task orientation has a significant influence on satisfaction.

Behavioral engagement

Liu (1989) believes that behavioral participation refers to the implementation of a series of classroom learning behaviors by students under the guidance of teachers, which is the external manifestation of cognitive participation. Student participation is a dual-performative behavior. On the one hand, it refers to the students' learning investment during the participation process. In teaching, student participation is not only about behavioral involvement but there should be a more profound level of engagement behind their behavior (Jackson, 1968).

Wu (2007) believes that the basic characteristics of effective teaching are to pay attention to students' comprehensive development, focus on the actual educational outcomes, and the process of students' active participation. Song (2022) believes that low student engagement in learning can lead to various learning problems. During the teaching process, introducing and enhancing students' behavioral participation can greatly stimulate students' learning enthusiasm, fully demonstrate teaching cases, further enhance students' practical ability, and compensate for the dullness and boredom of teaching, injecting new vitality into classroom teaching (Xu, 2018). Subsequently, a hypothesis is concluded:

Hypothesis 5: Behavioral engagement has significant influence on active learning.

Active Learning

Active learning refers to how students participate in learning activities through verbal and written expression and hands-on practice (Revans, 2011). Encouraging active learning among students is a challenge every educator faces in the classroom (Soto & Soto, 2023). Teachers can promote students' active learning and thus improve their learning efficiency (Elledge, 2018).

Sierra and Suárez-Collado (2023) found through their survey and analysis of 203 students that active learning helps to develop and sustain the impact of student learning in knowledge, skills, and affective domains. Active learning practices that achieve meaningful learning should be recognized and affirmed (Gadbury-Amyot et al., 2017). Reviewing course doubts through a learner-centered approach can enhance the value and comfort of learners (Pinsky & Wipf, 2000). Therefore, a hypothesis is conducted:

Hypothesis 6: Active learning has a significant influence on satisfaction.

Satisfaction

According to Oliver (1980), satisfaction refers to an individual's evaluation and emotional response to the entire experience process of a service or product. The satisfaction of college students with their learning is a psychological state that emerges after experiencing higher education, stemming from the relative relationship between expectations, processes, and outcomes and reflecting a value judgment that evaluates the performance gap between different elements and their degree of importance (Feng et al., 2022). College students' satisfaction with their learning is formed by the combination of many aspects of participating

in college learning. These specific activities, events, and processes are connected through certain logic to form the structure of college students' satisfaction (Wen & Shi, 2013). Puzziferro (2008) found that cognitive self-regulation, time management, and learning environment are significantly associated with learner satisfaction.

MacDonald et al. (2001) found a significant relationship between learners' expectations of learning outcomes and their demand for high-quality content, interaction, and services. Many educators have conducted various surveys and studies on student satisfaction in recent years. Some scholars believe that student satisfaction refers to students' overall perception of the educational process compared to their expected expectations during the process of receiving education and teaching (Xu et al., 2017).

Research Methodology

Research Hypotheses

The research framework of this study considers the causal relationships between various factors, including knowledge, skills, task orientation, behavioral engagement, active learning, and satisfaction. By examining these interconnections, the researchers seek to shed light on the intricate dynamics that impact the adoption and effectiveness of flipped classrooms in the context of an art-focused vocational university

H1: Knowledge has a significant influence on satisfaction.

H2: Knowledge has a significant influence on skills.

**H3:** Skills have a significant influence on satisfaction.

H4: Task orientation has a significant influence on satisfaction.

H5: Behavioral engagement has a significant influence on active learning.

H6: Active learning has a significant influence on satisfaction.

Conceptual Framework

This conceptual framework is developed from four theoretical models adapted from previous research frameworks. First, Murillo-Zamorano et al. (2019) studied the impact of Knowledge (K) on Skills (S1), the impact of Knowledge (K) on Satisfaction (S2), and the impact of Skills (S1) on Satisfaction (S2). Second, Pérez Ruiz et al. (2019) demonstrated that Task Orientation (TO) has an impact on Satisfaction (S2). Third, Jamaludin and Osman (2014) confirmed that Behavioral Engagement (BE) has an impact on Active Learning (AL). Fourth, Chau and Cheung (2018) demonstrated that Active Learning (AL) has an impact on Satisfaction (S2) (see Figure 1).

Figure 1

Conceptual Framework
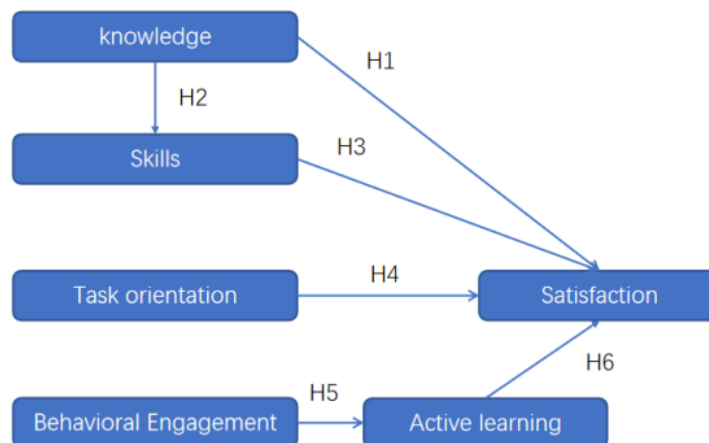
Note: Constructed by author.

Research Design

The researchers used a non-probability sampling quantitative method to send the survey questionnaire via the Internet to undergraduate students at the Chengdu Vocational University of Art who had experienced flipped classrooms. They collected and analyzed key factors that significantly impacted student satisfaction. The survey was divided into three parts. The first part identified the characteristics of the respondents by screening questions. The second part used Likert scales to test six proposed variables, ranging from strongly disagree to agree strongly. Finally, demographic questions about the school, major, and education level were asked.

The researchers conducted validity and reliability tests using Cronbach's Alpha method to ensure validity and reliability. Item Objective Congruence (IOC) Index was used to assess the content validity. The results show that all measuring items were passed at a score of above 0.6. The pilot test and Cronbach's Alpha were used to assess the internal consistency reliability (CA). Consequently, all constructs were approved at a score above 0.7 (Nunnally & Bernstein, 1994).

After the reliability test, the questionnaire was distributed to the target respondents, and 502 responses were received. The researchers analyzed the collected data using SPSS AMOS 26.0. Then, they used confirmatory factor analysis (CFA) to test its convergent validity and validity. The model fit measurement values were calculated through a comprehensive test of the given data to ensure the validity and reliability of the model. Finally, the researchers used a structural equation model (SEM) to test the influence of the variables.

Research Population and Sample

This study used undergraduate students from three majors at the Chengdu vocational university of Art. The sample size recommended for the structural equation model is at least 403 participants (Kline, 2015). This study used 502 respondents.

Data Analysis

The researchers used non-probability sampling, using judgment sampling to select three majors at the Chengdu Vocational University of Art that have experienced flipped classrooms, and then using quota sampling. Afterward, the researchers used Question Star, a tool for online surveys, which is popular in China, conducting convenience sampling to distribute the online questionnaire.

Demographics of Participants

The demographic target of the study is information from 502 participants. All respondents are current students at the Chengdu Vocational University of Art who have participated in a flipped classroom learning in three undergraduate majors: Broadcasting and Hosting, Film and Television Director, and Digital Media Art. The number of students in each major is 183, 46, and 273, respectively, accounting for 36.4%, 9.2%, and 54.4% of the total sample. Four academic years are represented in the sample: first year, second year, third year, and fourth year, with 199, 163, 95, and 45 students, respectively, accounting for 39.6%, 32.5%, 18.9%, and 9% of the total sample. (See Table 1)

Table 1

The demographic data

Demographic and General Data (n=502)	Category	Frequency	Percentage
Major	Broadcasting and Hosting	183	36.4%
	Film and Television Director	46	9.2%
	Digital Media Art	273	54.4%
Grade	1	199	39.6%
	2	163	32.5%
	3	95	18.9%
	4	45	9%

Results and Discussion

This study used confirmatory factor analysis (CFA). All items in each variable were significant, as shown in Table 2. Cronbach's Alpha was used to assess the internal consistency reliability (CA). Consequently, all constructs were approved at a score above 0.7 (Nunnally & Bernstein, 1994). Hair et al. (2006) emphasized the factor loading for must be at least 0.5, with P-value coefficients less than 0.05. In addition, according to Fornell and Larcker (1981), cutoff points were set at CR greater than 0.7 and AVE greater than 0.5

Table 2

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

Variables	Source of Questionnaire	No. of Item	CA	Factors Loading	CR	AVE
Knowledge (K)	Prosser (1987)	5	0.865	0.719-0.800	0.865	0.562
Skills (S1)	Xu et al. (2019)	5	0.906	0.716-0.834	0.907	0.582
Task orientation (TO)	Zandvliet and Fraser (2005)	7	0.837	0.676-0.799	0.838	0.510
Behavioral engagement (BE)	Chau and Cheung (2018)	7	0.912	0.661-0.792	0.911	0.534
Active learning (AL)	Hyun et al. (2017)	8	0.874	0.680-0.802	0.875	0.539
Satisfaction (S2)	Chau and Cheung (2018)	6	0.879	0.695-0.861	0.879	0.593

As shown in Table 3, the square root of AVE for each variable was greater than its correlation with other variables, indicating that the model had good discriminant validity.

Table 3

Square roots of AVEs and correlation matrix

	K	S1	TO	BE	AI	S2
K	**0.749**					
S1	0.247	**0.762**				
TO	0.174	0.392	**0.714**			
BE	0.322	0.364	0.336	**0.730**		
AL	0.144	0.257	0.416	0.352	**0.734**	
S2	0.279	0.315	0.36	0.334	0.32	**0.770**

Note: The diagonally listed value is the AVE square roots of the variable

Table 4 shows that the square root of the AVE of each variable was greater than its correlation coefficient with other variables, indicating that this model had good discriminant validity. In addition, the researchers used CMIN/DF, GFI, AGFI, NFI, CFI, TLI, and RMSEA as model fit indicators for the CFA test.

Table 4

Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/DF	≤ 5.0 (Wheaton et al., 1977)	1401.324/6142.282
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.877
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.859
NFI	≥ 0.80 (Wu & Wang, 2006)	0.867
CFI	≥ 0.80 (Bentler, 1990)	0.920
TLI	≥ 0.80 (Sharma et al., 2005)	0.914

Fit Index	Acceptable Criteria	Statistical Values
RMSEA	≤ 0.10 (Hopwood & Donnellan, 2010)	0.051
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,

Structural Equation Modeling (SEM)

The advantages make SEM an important statistical method in social science research (Wang et al., 2022). According to Table 5, the goodness of fit indices for the Structural Equation Model (SEM) is measured as demonstrated in Table 6. The calculation in SEMs and adjusting the model by using SPSS AMOS, the results of the fit index were presented as a good fit, which are CMIN/DF = 1.643, GFI = 0.902, AGFI = 0.888, NFI = 0.904, CFI = 0.960, TLI = 0.957 and RMSEA = 0.036, according to the acceptable values are mentioned.

Table 5

Goodness of Fit for Structural Model

Index	Acceptable Criterion	Statistical Values Before Adjustment	Statistical Values After Adjustment
CMIN/DF	≤ 5.0 (Wheaton et al., 1977)	1681.921/623 or 2.700	1017.188/619 or 1.643
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.848	0.902
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.830	0.888
NFI	≥ 0.80 (Wu & Wang, 2006)	0.841	0.904
CFI	≥ 0.80 (Bentler, 1990)	0.893	0.960
TLI	≥ 0.80 (Sharma et al., 2005)	0.886	0.957
RMSEA	≤ 0.10 (Hopwood & Donnellan, 2010)	0.058	0.036
Model Summary		**Unacceptable Model Fit**	**Acceptable Model Fit**

Hypothesis Outcomes

The research model judges the significance of the regression path coefficient according to its t-value and calculates the explanatory ability of the independent variable to the dependent variable according to R2. Table 6 reports that at the level of significance p=0.05, **P＜0.01, and ***P＜0.001. All the hypotheses were supported. The coefficient of influence of knowledge on satisfaction is 0.215, that of knowledge on skill is 0.278, that of skill on satisfaction is 0.156, that of task orientation on satisfaction is 0.244, and that of behavioral engagement on active learning is 0.393. Finally, that of active learning on satisfaction is 0.201. The behavioral engagement has the greatest influence on active learning.

Table 6

Summary of hypothesis tests

Hypothesis	Standardized path coefficient (β)	t-value	Testing result
H1: Knowledge has significant influence on satisfaction	0.215	4.209***	Supported
H2: Knowledge has significant influence on skills	0.278	5.486***	Supported
H3: Skills have significant influence on satisfaction	0.156	3.186***	Supported
H4: Task orientation has significant influence on satisfaction	0.244	4.919**	Supported
H5: Behavioral engagement has significant influence on active learning	0.393	7.696***	Supported
H6: Active learning has significant influence on satisfaction	0.201	4.171***	Supported

Note: *** $p<0.001$, ** $p<0.01$

Discussion

H1 has confirmed that knowledge is a factor that affects satisfaction, with a result of 0.215. Among the many factors that affect satisfaction, learning knowledge is a basic issue for completing a course. Now, teachers in various majors in Chinese universities have begun to pay attention to whether students' actual needs are being met and are increasingly focusing on whether learners' learning effects are significantly improved (Xu et al., 2022). The result for H2 is 0.278, indicating that knowledge impacts skills. Knowledge is the foundation between knowledge and skills, and to acquire survival and improvement skills, one must have an accurate understanding of knowledge (Wei, 2013). The result for H3 is 0.156, indicating that skills impact satisfaction. A stable workforce with skills requires regular surveys of satisfaction and the implementation of countermeasures (Chen, 2016). The result for H4 is 0.244, indicating that task orientation impacts satisfaction. Task orientation may cause pressure, prompting people to take corresponding measures to improve their abilities (DeShon & Alexander, 1996). The result for H5 is 0.393, indicating that behavioral participation impacts active learning. In the classroom teaching process, active participation can arouse students' interest and attention (Robles et al., 2019). Finally, the result for H6 is 0.201, indicating that active learning impacts satisfaction. Through their research, Zhang and Chen (2022) found that active learning behavior during course teaching is positively correlated with satisfaction and that behavioral participation has the greatest impact on active learning.

Conclusion and Recommendations

This study explores the factors that influence the satisfaction level of the flipped classroom teaching mode at the Chengdu Vocational University of Art. The model consists of 6 variables and 6 hypotheses. The hypotheses are the impact of knowledge on satisfaction, the impact of knowledge on skills, the impact of skills on satisfaction, the impact of task orientation on satisfaction, the impact of behavioral engagement on active learning, and the impact of active learning on satisfaction. The questionnaire survey was conducted among students who have experienced the flipped classroom teaching mode at the Chengdu Vocational University of Art, and the purpose of data analysis was to explore the factors that influence the satisfaction level of the flipped classroom teaching mode. Confirmatory factor analysis (CFA) was used to measure the validity and reliability of the conceptual model. The structural equation model (SEM) was used to analyze the proposed relationships among the hypotheses.

The research findings are as follows. Firstly, behavioral engagement has the greatest impact on active learning, which means that participation in behavior largely determines whether students are actively learning. Active learning has a significant impact on satisfaction. This indicates that behavioral engagement indirectly influences satisfaction. Secondly, knowledge has a significant impact on satisfaction. Knowledge is the foundation for completing course learning, and it also has a significant impact on skills, and skills have a significant impact on satisfaction. Students hope to improve their knowledge and skills through flipped classroom learning. Finally, task orientation has a significant impact on satisfaction. Clear goals can help students better complete flipped classroom learning. In summary, this study identifies knowledge, skills, and task orientation as important factors influencing undergraduate students' satisfaction level at the Chengdu Vocational University of Art under the flipped classroom teaching mode. Knowledge has a significant impact on the learning of skills, and behavioral engagement has the greatest impact on active learning, which indirectly positively impacts satisfaction.

Recommendations

Researchers have found that through a survey of satisfaction with flipped classrooms at the Chengdu Vocational University of Art, it can be concluded that the key factors affecting satisfaction are knowledge, skills, task orientation, and active learning. The main factor affecting satisfaction with flipped classrooms is task orientation. Therefore, it is recommended that teachers clearly define task orientation and set clear goals during the teaching process to improve the flipped classroom. Firstly, learning knowledge is the basic purpose of flipped classroom teaching, and the absorption and level of students' knowledge are topics that every educator has been concerned about. Flipped classrooms give students a basic understanding of course content before class, allowing them to adjust the pace of learning according to their foundation and time. After-class activities can strengthen and supplement course content (Nishigawa et al., 2017). Secondly, in flipped classroom teaching, knowledge and skills grow together. Knowledge and skills are a unified whole in which knowledge is the foundation of skills, and skills are the use and development of knowledge (Wei, 2013). Thirdly, it is recommended that teachers encourage students' behavioral participation while using the flipped classroom teaching mode, as behavioral participation has a positive impact on active learning,

and active learning has a positive impact on satisfaction. Thus, flipped learning increases students' active participation and learning motivation, effectively inducing deeper learning (Gu, 2016). Finally, the new classroom model can increase students' interest in learning, allowing them to enjoy their study time. In summary, the results of this study will help the Chengdu Vocational University of Art or similar vocational universities gain reference information and inspiration in the practical aspects of new teaching methods, promote the flipped classroom teaching mode, and promote more possibilities for education in the Internet era.

Limitations and Further Study

The limitations of this study are as follows. The research subjects are students who have experienced the flipped classroom teaching model at the Chengdu Vocational University of Art, the first cohort of professional undergraduate students. Therefore, the research results only represent students' satisfaction with the flipped classroom while studying at the Chengdu Vocational University of Art. The population and sample in the study are all from the Chengdu Vocational University of Art, and the flipped classroom model studied is limited to professional courses. There are differences in the difficulty, structure, and content between professional and general courses. Therefore, the results of this study will only affect the teaching of professional course teachers. The limitations of this study also indicate the control of other unrelated factors. Considering the complexity of the flipped classroom, there may be other intermediate variables that affect the results. Therefore, the results obtained need to be further verified by future researchers.

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