

A Flipped Classroom Intervention for Fostering Academic Achievement and Learning Motivation for Chinese Higher Vocational Students

Sun Yue¹, Phananoi Rotchu², Parussaya Kiatkheeree³

1 Master of Education in Curriculum and Instruction Suratthani Rajabhat University

2,3 Faculty of Education, Suratthani Rajabhat University

e-mail 67052535106@student.sru.ac.th

Abstract

Against the background of high-quality development of China's higher vocational education, traditional teacher-centered classrooms generally face problems such as weak practical ability of students, insufficient learning motivation, and disconnection between theory and practice. This study took the course *Mental Health Education for College Students* as the research carrier, and selected 30 freshmen majoring in Digital Media Art from Quanzhou Light Industry Vocational College as research subjects. Adopting a one-group pretest-posttest quasi-experimental design, this study constructed and implemented a three-stage flipped classroom teaching model of "pre-class micro-lecture foundation laying + in-class situational practice + post-class transfer and application", integrated information technologies including Xuexitong platform, AI teaching assistants and VR scenario simulation, and carried out an 8-week teaching intervention. Quantitative and qualitative data were collected through academic achievement tests, learning motivation scales, satisfaction questionnaires, classroom observations and semi-structured interviews. Statistical analysis showed that after the intervention, students' scores in theoretical knowledge and practical application improved significantly ($p < 0.001$), with growth rates of 26.1% and 25.4% respectively. Students' intrinsic learning motivation was effectively activated, and the improvement of underachieving students was more prominent. The overall student satisfaction with the teaching model reached 4.42/5. This study verifies that the flipped classroom adapts to the competency-based orientation of higher vocational education, and has significant effects on improving academic performance and stimulating learning motivation of vocational college students, providing empirical evidence and practical paths for the teaching reform of humanities and social science courses in higher vocational colleges.

Keywords: flipped classroom; higher vocational education; academic achievement; learning motivation; mental health education

1. Background and Significance of the Problem

1.1 Development Status and Reform Demands of China's Higher Vocational Education.

In recent years, China's higher vocational education has entered a stage of high-quality development, with the number of higher vocational colleges accounting for 54.5% of the total number of regular colleges and universities, undertaking the core mission of cultivating technical and skilled talents (China Vocational and Technical Education Society, 2024). The *National Vocational Education Reform Implementation Plan* clearly proposes to deepen teaching reform, strengthen practical teaching, and improve students' professional quality and comprehensive ability (State Council of China, 2019).

However, the traditional teacher-centered teaching model is still dominant in vocational classrooms, leading to prominent problems such as students' weak practical ability, insufficient learning motivation, and disconnection between theoretical knowledge and practical application. Relevant data show that vocational college students' classroom attention span is generally less than 20 minutes, and the knowledge application conversion rate is less than 30% (Ministry of Education of China, 2019). Against this background, innovating teaching models to improve the quality of talent cultivation has become an urgent demand for the reform of higher vocational education.

1.2 Application Value of Flipped Classroom in Vocational Education.

The flipped classroom, as a typical blended teaching model, reconstructs the teaching process by shifting knowledge delivery to pre-class autonomous learning and focusing classroom time on interactive inquiry and practical application. Originated from the teaching practice of American teachers Bergmann and Sams in 2007, this model has been widely promoted globally with the development of educational information technology (Bergmann & Sams, 2012).

Its core features of "pre-class independent learning + in-class deep interaction" fit the learning characteristics of vocational students who emphasize practical application and operational skills, and can effectively solve the three core dilemmas of traditional vocational classrooms: the disconnect between theory and practice, the lack of student subjectivity, and the single evaluation method. Existing studies have confirmed that flipped classrooms can significantly improve students' academic performance and learning engagement in STEM majors such as nursing and mechanical engineering, but there is insufficient empirical research on its application in humanities and social science courses such as mental health education.

1.3 Significance of the Study .

Theoretically, this study explores the mechanism of flipped classroom affecting vocational students' academic performance and learning motivation, expands the application scenarios of constructivist learning theory and ARCS motivation model in vocational education, and enriches the theoretical system of flipped classroom research.

Practically, this study constructs a localized flipped classroom teaching model suitable for mental health courses in vocational colleges, provides replicable operational plans for frontline teachers, and offers practical references for promoting the teaching reform of humanities and social science courses in higher vocational education.

2. Research Objectives

This study aims to explore a localized flipped classroom teaching model suitable for higher vocational education through systematic instructional design and practical verification, and comprehensively examine its impact on students' academic performance and learning motivation. The specific research objectives are as follows:

First, compare the differences in students' academic performance before and after the implementation of flipped classroom. Focusing on the course *Mental Health Education for College Students*, this study constructs a dual-dimensional evaluation system of theoretical knowledge and practical application, and analyzes the improvement effect of flipped classroom on students' knowledge mastery and practical ability through pre-test and post-test comparisons.

Second, explore the change trend of students' learning motivation before and after the implementation of flipped classroom. Based on the ARCS motivation model, this study analyzes the

changes of students in four dimensions: attention, relevance, confidence and satisfaction, and reveals the motivational activation mechanism of flipped classroom for vocational students.

Third, investigate students' satisfaction and experience feedback after the integration of flipped classroom. Construct a multi-dimensional satisfaction evaluation system covering resource adaptability, interactive experience and effect perception, and summarize the optimization path of flipped classroom teaching based on student feedback.

3. Research Hypotheses

Based on the characteristics of flipped classroom and the orientation of higher vocational education, combined with the characteristics of mental health education courses, this study proposes the following research hypotheses:

Hypothesis 1: The implementation of flipped classroom model will lead to statistically significant improvement in students' academic performance. After the intervention, students' scores in theoretical knowledge test and practical task evaluation will be significantly higher than those before the intervention ($p < 0.05$), and the improvement in practical dimension will be more prominent.

Hypothesis 2: After participating in flipped classroom teaching, students' learning motivation will be significantly improved compared with that before implementation. All dimensions of the learning motivation scale will show significant enhancement ($p < 0.05$), among which the intrinsic motivation dimension will have the most significant improvement.

Hypothesis 3: Students have high satisfaction with the flipped classroom model and positive learning experience feedback. The overall satisfaction score is above 4.2 on a 5-point scale, and satisfaction is positively correlated with academic performance and learning motivation.

4. Scope of the Research

4.1 Research Subjects and Geographical Scope : This study was conducted at Quanzhou Light Industry Vocational College in Fujian Province, China. The research subjects were 30 freshmen of the 2025 grade majoring in Digital Media Art, selected by cluster sampling, with an average age of 19.2 ± 0.8 years and a male-female ratio of approximately 3:2. All participants were enrolled in the compulsory public course *Mental Health Education for College Students*, and had no prior systematic experience of flipped classroom learning. The baseline test confirmed that there were no significant differences in initial academic performance and learning motivation levels among the samples ($p > 0.05$), which met the homogeneity requirement.

4.2 Research Variables : The independent variable of this study is the systematic implementation of flipped classroom teaching intervention, which includes three stages: pre-class autonomous learning with micro-lectures, in-class situational practice and collaborative inquiry, and post-class knowledge transfer and application, supported by information technologies such as smart teaching platforms and VR simulation.

The dependent variables include three aspects: (1) students' academic performance, including theoretical knowledge test scores and practical task completion quality; (2) students' learning motivation, covering four dimensions of attention, relevance, confidence and satisfaction; (3) students' satisfaction with the flipped classroom model.

4.3 Timeframe and Limitations : The total research duration was 8 weeks, including 1 week of pre-test, 4 weeks of teaching intervention, 1 week of post-test and data collection, and 2 weeks of data sorting and analysis. Due to the limitations of sample size and major scope, the findings of this study are mainly applicable to humanities and social science courses in higher vocational colleges, and the generalizability to other types of courses needs further verification.

5. Research Methodology

This study adopted a one-group pretest-posttest quasi-experimental design. By implementing flipped classroom intervention on the same group of subjects, the changes of academic performance and learning motivation before and after the intervention were compared to verify the effect of the teaching model. This design focuses on the direct correlation between "intervention and effect", and is suitable for exploring the influence of specific teaching models on core learning indicators of vocational college students.

The core intervention is a three-stage linked flipped learning model constructed for four core units of the course (emotional management, stress coping, interpersonal communication and career adaptation):

Pre-class stage: Students watch 8-10 minute micro-lectures on the Xuexitong platform, complete supporting online quizzes, and submit personalized question lists. Teachers adjust the key points of in-class teaching according to the background data of the platform.

In-class stage: Organize collaborative activities in groups of 6, including role-playing of psychological scenarios, VR social scenario experience, and targeted Q&A by teachers. Classroom time is allocated according to the ratio of "50% independent reflection + 30% group discussion + 20% collective Q&A".

Post-class stage: Students submit psychological adjustment practice logs, use intelligent tools to complete reflection reports, and participate in online sharing sessions to promote the transformation of knowledge into practice.

6. Research Instruments

To ensure the validity and reliability of the research data, this study adopted four types of research tools, combining quantitative measurement and qualitative feedback:

6.1 Academic Performance Test : The same set of test papers was used for pre-test and post-test, including two parts: theoretical knowledge test and practical task evaluation. The theoretical test consists of 25 objective questions with a full score of 100, focusing on the mastery of basic concepts of mental health, with a KR-20 coefficient of 0.86. The practical task adopts a five-level scoring standard, evaluating three situational tasks from three dimensions: scientific validity (30%), occupational suitability (40%) and innovation (30%), with an inter-rater reliability ICC of 0.89.

6.2 Learning Motivation Scale : The revised Vocational College Students' Learning Motivation Scale adapted from the ARCS motivation model was adopted, including 24 items covering four dimensions: intrinsic goal orientation, perceived task value, self-efficacy and extrinsic regulation. A 5-point Likert scale was used, with a Cronbach's α coefficient of 0.89 for the total scale, and good structural validity confirmed by confirmatory factor analysis.

6.3 Student Satisfaction Questionnaire : A self-designed flipped classroom satisfaction questionnaire was adopted, including 20 items covering three dimensions: resource adaptability, interactive experience and effect perception. A 5-point scale was used, with a Cronbach's α coefficient of 0.91, and exploratory factor analysis showed that the cumulative variance explanation rate reached 76.3%.

6.4 Auxiliary Qualitative Tools : Classroom participation observation form and semi-structured interview outline were used to record students' behavioral, cognitive and emotional engagement in class, and to collect in-depth experience and improvement suggestions from students. The inter-coder consistency coefficient of the interview coding was 0.87, meeting the reliability requirement.

7. Data Collection

The data collection process ran through the whole research cycle, and the specific time nodes and contents were as follows:

Pre-test stage (Week 1): Conducted academic performance pre-test and learning motivation scale pre-test for all subjects, collected basic information of students, and established a baseline database. Meanwhile, trained students on the operation process of flipped classroom and the use of the learning platform.

Intervention stage (Weeks 2-5): While implementing flipped classroom teaching, collected process data through the learning platform backend, including micro-lecture viewing duration, quiz accuracy, and discussion participation frequency. At the same time, two observers recorded classroom participation twice a week.

Post-test stage (Week 6): Administered academic performance post-test and learning motivation post-test consistent with the pre-test tools, and distributed satisfaction questionnaires to all students.

In-depth interview stage (Weeks 7-8): Selected 8 students with different learning foundations for semi-structured interviews, each lasting about 40 minutes. With the consent of the interviewees, the whole process was recorded and transcribed into text for qualitative analysis.

8. Data Analysis

This study adopted a mixed analysis strategy of "quantitative dominance and qualitative assistance", and processed data through the following methods:

8.1 Quantitative Data Analysis : SPSS 26.0 statistical software was used for data analysis. First, descriptive statistics were conducted to calculate the mean and standard deviation of each variable. Second, paired-sample t-test was used to compare the differences in academic performance, learning motivation and other indicators before and after the intervention, to verify the effect of flipped classroom. Third, Pearson correlation analysis was used to explore the correlation between online learning behavior, learning motivation and academic performance. The significance level was set at $\alpha=0.05$.

8.2 Qualitative Data Analysis : Content analysis method was applied to interview transcripts, reflective journals and open-ended questionnaire responses. Using Nvivo 12 software, three-level coding (open coding → axial coding → selective coding) was carried out to extract core themes. The coding results were cross-validated by two researchers to ensure the reliability of qualitative analysis, and form triangulation verification with quantitative results.

9. Research Summary

Systematic data analysis yields four main findings:

First, academic performance improved significantly ($p < 0.001$). Theoretical scores rose from 62.35 to 78.64 (26.1% growth) and practical scores from 65.72 to 82.45 (25.4% growth), with emotional regulation (35.7%) and stress management (32.5%) showing the most prominent gains. The post-test pass rate exceeded 92.9% across all dimensions, and the theoretical dimension reached 100%.

Second, intrinsic learning motivation was effectively activated, with all dimensions improving significantly ($p < 0.01$). Intrinsic goal orientation had the highest growth rate (29.3%), followed by self-efficacy (28.0%) and perceived task value (26.3%), while extrinsic regulation increased the least (9.9%). Students' psychological distress such as anxiety, depression and interpersonal sensitivity was also significantly alleviated ($p < 0.001$).

Third, classroom participation improved markedly, especially for underachieving students. The average comprehensive engagement score reached 84.52, with 54.3% of students achieving excellent performance. The underachieving group recorded a 25.1% participation growth, significantly higher than the 12.3% of the high-achieving group, indicating the flipped classroom narrows the participation gap between students with different learning foundations.

Fourth, overall student satisfaction with the model was high at 4.42/5, with 88.6% of students scoring 4 or above. The interactive experience dimension ranked highest (4.45), and 89.3% of students recognized the effects of group collaboration and teacher-student interaction. Correlation analysis showed post-class task quality had the strongest correlation with academic performance ($r = 0.82$), and learning motivation was significantly positively correlated with academic performance ($r = 0.76$).

10. Discussion

10.1 Verification of Research Hypotheses : All three research hypotheses of this study were effectively verified.

First, the significant improvement in academic performance confirmed Hypothesis 1, which is consistent with the findings of existing vocational education research (Chen et al., 2022). The closed-loop design of "pre-class micro-lectures + in-class situational practice + post-class application" conforms to the core principle of constructivist learning theory of "active construction and situational application", and effectively solves the dilemma of disconnection between theory and practice in traditional teaching.

Second, the significant enhancement of intrinsic motivation confirmed Hypothesis 2. The multi-dimensional design of flipped classroom fits the ARCS motivation model: vocational scenario cases enhance content relevance, tiered task design enhances students' self-confidence, and instant feedback strengthens learning satisfaction, realizing the transformation of students' learning motivation from passive exam-oriented to active skill improvement.

Third, high student satisfaction confirmed Hypothesis 3, which is consistent with the research conclusion that satisfaction is driven by resource visualization and real-time interaction. The localized design integrating vocational students' real psychological confusion and career scenarios further improves the adaptability of the model.

10.2 Analysis of Core Mechanisms : The study revealed a complete transmission chain of "motivation activation $\rightarrow$ behavioral engagement $\rightarrow$ academic improvement". Flipped classroom stimulates students' intrinsic learning motivation by satisfying their three basic psychological needs of

autonomy, competence and belonging, thereby driving them to invest in higher-quality pre-class and in-class learning behaviors, and ultimately achieving academic improvement.

In addition, information technology empowerment is an important supporting mechanism: the learning platform's data tracking function realizes precise teaching, AI teaching assistants provide instant feedback, and VR simulation enhances the immersion of practical training, jointly promoting the improvement of teaching effect.

10.3 Research Limitations : This study has certain limitations: First, the sample size is small and limited to digital media art majors, so the generalizability of the findings needs to be expanded. Second, the single-group pre-test post-test design lacks a control group of traditional teaching, which cannot completely exclude the interference of other variables. Third, the 8-week intervention cycle is short, and the long-term sustainability of the effect needs further follow-up investigation.

11. Suggestions/Recommendations

11.1 Teaching Optimization Suggestions : In terms of improving academic performance, first, strengthen the deep integration of "professional scenarios - knowledge - skills", and align practical tasks with occupational needs according to the characteristics of different majors. Second, optimize the closed loop of pre-class, in-class and post-class teaching: control the duration of micro-lectures at 8-10 minutes, allocate more classroom time to skill practice, and design tiered post-class extension tasks. Third, improve the diversified evaluation system combining formative assessment (60%) and summative assessment (40%), and increase the weight of process performance and practical ability.

In terms of activating learning motivation, implement precise motivation driving based on the ARCS model: use diversified resources and interactive activities to stimulate attention; embed occupational cases and alumni experience to enhance content relevance; adopt progressive task design to cultivate students' self-confidence; establish a real-time feedback and multi-level incentive mechanism to enhance learning satisfaction. At the same time, provide personalized guidance for students with different motivation types.

11.2 Promotion and Development Suggestions : First, promote inter-school resource sharing, standardize the flipped classroom teaching framework and resource templates, and build a regional shared platform for high-quality teaching resources. Second, carry out special teacher training to improve teachers' three core competencies: resource development, learning analysis and motivation guidance. Third, schools should provide policy and technical support, allocate special funds for resource development and equipment procurement, and establish incentive mechanisms to encourage teachers to participate in flipped classroom reform.

11.3 Future Research Directions : Future research can expand the sample size and major coverage, adopt a quasi-experimental design with a control group to further verify the intervention effect. Extend the intervention cycle and carry out follow-up studies to observe the long-term sustainability of the effect. In addition, explore the integration of emerging technologies such as generative AI and metaverse with flipped classrooms to explore more efficient motivation activation and academic improvement paths.

12. References

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