

AN EMPIRICAL OF THE MOOC TEACHING MODEL OF SICHUAN UNIVERSITY: COLLABORATIVE MODEL AND PERSONLIZED LEARNLNG PATHS BASED ON THE VARK LEARNING STYLE CHINA

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ABSTRACT

Introduction: Massive Open Online Courses (MOOCs) have become an important approach to online education due to their flexibility and accessibility. However, improving learning effectiveness requires instructional strategies that accommodate diverse learning styles. This study aims to enhance the effectiveness of the MOOC teaching model at Sichuan University of Media and Communications by integrating collaborative learning and personalized learning pathways based on the VARK learning style model (Visual, Auditory, Reading/Writing, and Kinesthetic). **Objectives:** The objectives of this study were: (1) to examine the impact of collaborative learning on learning outcomes; (2) to investigate the effectiveness of personalized learning pathways; and (3) to examine the moderating role of VARK learning styles in the relationship between collaborative learning, personalized learning pathways, and learning outcomes. **Methods:** This study employed a mixed-methods research design. Quantitative data were collected through a questionnaire administered to 218 undergraduate students majoring in Digital Media Arts from the 2021–2023 cohorts at Sichuan University of Media and Communications. Qualitative data were obtained through in-depth interviews to explore students' learning experiences and engagement with the MOOC platform and to evaluate the effectiveness of personalized learning pathways supported by dynamic content adaptation and AI-powered recommendation mechanisms. **Results:** The findings revealed that collaborative learning significantly improved students' academic performance, learning engagement, and learning satisfaction through enhanced interaction, knowledge sharing, and peer assessment. Personalized learning pathways supported by AI-powered recommendation mechanisms and dynamic content adaptation significantly enhanced learning efficiency

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and learner motivation. Furthermore, VARK learning styles significantly moderated the relationships between collaborative learning, personalized learning pathways, and learning outcomes, indicating that different learning styles influence the effectiveness of online learning strategies. **Conclusion:** Integrating collaborative learning, personalized learning pathways, and VARK learning style adaptation enhances the effectiveness of MOOC-based instruction by improving learning achievement, engagement, and learner satisfaction. The findings provide theoretical and practical implications for designing flexible, personalized, and interactive online learning environments in higher education.

1. INTRODUCTION

Collaborative model and personalized learning paths based on the VARK learning style. Massive Open Online Courses (MOOCs), as an innovative form of education, (Lee, 2019)^[6] have rapidly gained worldwide popularity due to their openness, flexibility, and broad accessibility (Trehan et al., 2017)^[9] In China, the Ministry of Education has placed great importance on deeply integrating information technology with education (Xu et al., 2010)^[11] Since 2012, several policy documents have been issued to support and promote online education. The Ten-Year Development Plan for Educational Informatization (2011–2020) has facilitated quicker sharing of high-quality educational resources to drive both equity and quality in education (Ma, 2025)^[7] These policies have fueled the growth of MOOC. platforms such as Xuetang X, Chinese University MOOC, (Zhang, 2016)^[12] Good University Online, Wisdom Tree, and Superstar MOOC, which offer a wide variety of courses and learning resources for learners (Lee et al., 2021)^[5] the impact of personalized teaching models on learning outcomes (Cheng et al., 2023)^[2]

This research employs both quantitative and qualitative methods to assess learning outcomes, as well as conducting empirical research to evaluate the effectiveness of personalized teaching models on student achievement. The study is of high theoretical value and offers practical support for improving and innovating MOOC platforms, benefiting both instructors and platform developers. Understanding the issues in this research: What are the detailed stories of collaborative learning in relation to outcomes for effectively examining personalized learning paths and the overall role of learning styles as a control variable in research studies. This research is an important part of exploring platform models to enhance informational content and working models as innovations that accommodate future changes.

2. OBJECTIVES

1. To study the impact of cooperative learning on students' academic achievement outcomes within the teaching model of Sichuan University to enhance students' participation in online courses.
2. Examine the frequency and quality of group interactions during cooperative learning in relation to the effectiveness of individualized learning pathways.
3. To study cooperative assessment and the overall role of learning models as a control variable within learning pathways based on the VARK learning model.

3. HYPOTHESIS

Ha: Cooperative learning significantly enhances students' academic achievement in large-scale open online courses.

Hb: The frequency and quality of group interactions during cooperative learning are significantly and positively correlated with the learning engagement.

Hc: Peer assessment, an important aspect of cooperative learning, has a significant positive effect on learning satisfaction.

4. LITERATURE REVIEW

In the context of modern education, the rapid development of Internet technology has created many possibilities for transforming teaching methods (Xu, 2008)^[11] It has discussed the adaptation of "teaching methods and learning models to be in line with emerging new technologies" or "modifying instructional approaches to accommodate changes brought about by internet technology." The emergence of massive open online courses (MOOCs) (Hew & Cheung, 2014)^[4] has not only significantly promoted the widespread adoption of online education but has also brought about profound challenges and demands for innovation in traditional teaching models (Boon & Edler, 2018)^[1] MOOCs have been considered tools that help broaden educational opportunities, reduce restrictions of place and time, and support self-directed and lifelong learning.

They challenge traditional lecture-based teaching and encourage a shift towards learner-centered curriculum design. This requires the development of teachers' skills in using technology and designing effective online learning experiences. Consequently, online collaborative learning an innovative educational model that integrates network technology and collaborative learning theories has become an increasing focus of research in both academic and practical educational contexts. (Deng et al., 2019)^[3] linked to challenges in maintaining motivation and persistence in online learning that lacks direct instructor supervision,

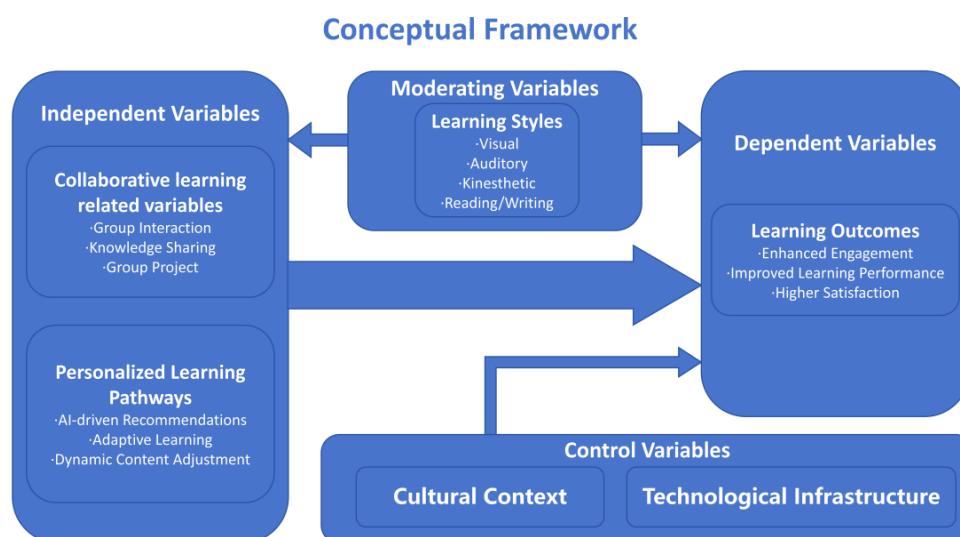
Special attention will be paid to the development, theoretical foundations, and practical applications of collaborative learning and MOOCs in various educational contexts. By analyzing keywords and high-frequency terms (Zheng et al., 2015^[13]; Staubitz et al., 2015)^[8]

This chapter identifies current research issues and trends, providing insights into how these strategies operate in educational contexts both globally and locally: the use of digital platforms that can accommodate large numbers of simultaneous learners (scalability), the development of teaching tools such as videos, forums, automated assessments, and AI for tracking learning outcomes, challenges of Internet and device access for learners in remote or underserved areas, and safeguarding learner data security and privacy in online systems.

5. CONCEPTUAL FRAMEWORK

Table 1

Conceptual Framework of the Study



The Conceptual Framework of the study

The framework elucidates the intricate relationships among these variables and establishes a foundation for the formulation of research hypotheses and the execution of empirical analyses. Several hypotheses may be derived from this framework: cooperative learning significantly enhances students' academic performance in massive open online courses. Furthermore, the frequency and quality of group interactions during cooperative learning are significantly and positively correlated with learning engagement. Peer assessment, a crucial element of cooperative learning, exerts a significantly positive influence on learning satisfaction.

6. METHODOLOGY

This study employs a mix methods research approach, integrating quantitative and qualitative methods through surveys, in-depth interviews, and experiments. This approach comprehensively analyzes the roles of collaborative learning, individualized learning pathways, and learning styles in MOOC environments.

1. Population and Sample

The total sample size for this study was 281 students selected from six different classes. The sample size was determined based on the following factors.

This sample size was large enough for a reliable quantitative analysis. 1) Statistical Significance: The research findings were statistically significant. Data obtained from the questionnaires can be used in various statistical tests, such as correlation and comparative analyses, to identify significant patterns and

relationships. The chosen sample size also considers the feasibility of conducting research, including data collection through questionnaires, in-depth interviews, and experimental activities. A sample of 281 individuals allowed for comprehensive data collection and analysis within a reasonable timeframe without compromising the quality of the research.

2. Research Tools

The design of mixed-methods research instruments involves integrating quantitative tools (questionnaires) and qualitative tools (interviews) to address complex research questions, emphasizing data consistency. The instruments must be designed to align with the objectives and format of the research, whether in parallel or explanatory form, in order to collect data from a target group of 281 participants and conduct in-depth interviews.

The research instrument underwent content validity checks using the Intermediate Occurrence Ratio (IOC), with values ranging from 0.67 to 1.00. The reliability and internal consistency of the questionnaire were analyzed using Cronbach's alpha coefficient, a statistical measure for evaluating the reliability or internal consistency of research tools such as questionnaires or tests. The results showed consistency and reliability scores greater than 0.70.

After revising the instrument based on expert recommendations, it was tested on a pilot group of 30 individuals with characteristics similar to those of the target population.

7. RESULTS

Table 2

Demographic Characteristics of the Study Participants (N = 281)

Category	Age 18-20	Age 21-23	Male	Female	2021 Cohort	2022 Cohort	2023 Cohort	Total
Count	61	203	91	112	65	72	66	281
Percentage	30.05%	69.95%	44.83%	55.17%	32.02%	35.47%	32.51%	100%

Demographic Profile of the Study Sample

The study sample consists of undergraduate students from the Digital Media Arts program at Sichuan University of Media and Communications. A total of 218 questionnaires were distributed, and 203 valid responses were collected, achieving a response rate of 93.12%. The respondents were distributed across three academic years (2021, 2022, and 2023) and five different classes, ensuring a representative and comprehensive dataset. According to the statistical results, 61 respondents (30.05%) were aged between 18 and 20, while 142 respondents (69.95%) were aged between 21 and 23. The higher proportion of students aged 21–23 reflects the fact that most respondents are in their sophomore to senior years. Regarding gender distribution, there were 91 male students (44.83%) and 112 female students (55.17%), indicating a relatively balanced gender ratio with a slight female predominance, which aligns with the overall demographic trend

in the Digital Media Arts program. In terms of academic year distribution, 65 students (32.02%) were from the 2021 cohort, 72 students (35.47%) were from the 2022 cohort, and 66 students (32.51%) were from the 2023 cohort. The sample distribution across different academic years is relatively balanced, ensuring a solid foundation for further analysis. The demographic profile of the study sample demonstrates a diverse representation across age, gender, and academic year. This diversity enhances the generalizability of the findings and provides a robust basis for subsequent quantitative analyses.

Table 3

Distribution of MOOC Platform Usage Among Participants

Platform	Total Users (N=163)	Percentage (%)
China University MOOC	120	73.62%
Chaoxing XuetangX	110	67.48%
XuetangX	85	52.15%
Coursera	35	21.47%
Other Platforms	12	7.36%

Among students who use MOOC platforms, *China University MOOC* was the most popular, with 120 students (73.62%) selecting it. *Chaoxing XuetangX* followed closely with 110 students (67.48%), while *XuetangX* attracted 85 students (52.15%). In contrast, international platforms such as *Coursera* had a relatively lower adoption rate, with only 35 students (21.47%) reporting usage. Additionally, 12 students (7.36%) indicated using other platforms. These findings highlight the higher popularity of domestic MOOC platforms, likely due to their localized content, ease of access, and alignment with students' academic requirements. The lower usage of international platforms such as *Coursera* may be attributed to language barriers and the perceived misalignment between available courses and students' learning objectives.

Table 4

Reasons for Using MOOC Platforms

Reason	Students (N=163)	Percentage (%)
Earning Academic Credits	140	85.89%
Personal Interest	90	55.21%
Career Development	50	30.67%
Other	10	6.13%

Reasons for Using MOOC Platforms

The primary reasons for using MOOC platforms varied among students, with earning academic credits being the most significant factor, cited by 140 students (85.89%). This finding suggests that students predominantly perceive MOOC platforms as a means to fulfill curriculum requirements. Personal interest

was the second most common reason, with 90 students (55.21%) selecting it, indicating that students are also motivated by the diverse learning opportunities provided by MOOC platforms beyond their formal coursework.

Research Question 1 To study the impact of cooperative learning on students' academic achievement outcomes within the teaching model of Sichuan University to enhance students participation in online courses.

Collaborative learning significantly improves MOOCs learners' academic performance, engagement, and satisfaction by enhancing the quality of interaction and knowledge sharing among students. These findings validate Hypothesis H1.1 (Collaborative learning significantly enhances MOOC learners' academic performance) and

Hypothesis H1.2 (The frequency and quality of group interaction in collaborative learning are significantly positively correlated with learning engagement), demonstrating that collaborative learning effectively improves learning outcomes, with frequent and high-quality group interactions playing a key role in boosting academic performance and motivation. Furthermore, the peer assessment mechanism further increased students' satisfaction, supporting

Hypothesis H1.3 (Peer assessment, as an essential form of collaborative learning, has a significant positive impact on learning satisfaction). These findings theoretically support the "social constructivism" assumption within collaborative learning theory and provide practical implications for the design of collaborative learning strategies in MOOC platforms.

Research Question 2: Examine the frequency and quality of group interactions during cooperative learning in relation to the effectiveness of individualized learning pathways.

Personalized learning paths, through dynamic content adjustment and AI recommendation mechanisms, demonstrate significant advantages in enhancing learning outcomes. The results indicate that the dynamic adjustment path optimizes learning efficiency by providing highly relevant supplementary resources based on real-time analysis of students' learning progress and weaknesses, validating Hypothesis

H1.2 (Dynamic content adjustment significantly improves learners' learning experience and progress). The AI-recommended path effectively stimulates students' interest and motivation for exploration by offering highly relevant learning resources based on their interests and preferences, supporting

Hypothesis H2.1 (The relevance of AI-recommended content in personalized learning paths significantly enhances learners' learning outcomes). Additionally, the findings show that the impact of personalized paths on learning outcomes varies depending on students' learning levels, confirming

Hypothesis H2.3 (The effectiveness of personalized learning paths varies according to learners' proficiency levels).

Research Question 3. To study cooperative assessment and the overall role of learning models as a control variable within learning pathways based on the VARK learning model.

Learning styles play a significant moderating role in the relationship between collaborative learning, personalized learning paths, and learning outcomes. The study found that visual learners excel in design and planning tasks, kinesthetic learners perform better in hands-on tasks, and auditory learners prefer

voice-based resources and interactive content. These findings validate Hypothesis H3.1 (Learning styles play a significant moderating role in the relationship between collaborative learning and learning outcomes) and Hypothesis H3.2 (Learning styles significantly moderate the relationship between personalized learning paths and learning outcomes), confirming that learning styles influence the effectiveness of both collaborative and personalized learning strategies. Hypothesis H3.3 (Learners with different learning styles exhibit significant differences in the effectiveness of collaborative learning and personalized learning paths) was also partially supported, indicating that learners with different learning styles respond differently to various learning strategies.

8. DISCUSSIONS

The findings of this study contribute to the theoretical understanding of collaborative learning, personalized learning pathways, and adaptive online learning in MOOC environments. The results demonstrate that collaborative learning significantly enhances students' academic achievement, learning engagement, and learning satisfaction through knowledge sharing, peer interaction, and collaborative activities. These findings are consistent with previous studies indicating that collaborative learning is a key strategy for improving learner participation and interaction in MOOCs. These findings are also consistent with the empirical findings presented in this study (Deng et al., 2019^[3]; Staubitz et al., 2015)^[8] The study also confirms that personalized learning pathways supported by AI-powered recommendation mechanisms and dynamic content adaptation improve learning efficiency and learner motivation. These findings support previous research suggesting that personalized learning environments enhance learner autonomy and provide more flexible learning experiences in online education (Cheng et al., 2023^[2]; Hew & Cheung, 2014)^[4] Furthermore, the results indicate that VARK learning styles significantly moderate the relationships between collaborative learning, personalized learning pathways, and learning outcomes. This finding suggests that learners with different learning preferences respond differently to collaborative and personalized learning strategies. Therefore, MOOC instructional design should incorporate adaptive learning approaches that accommodate learner diversity and maximize learning effectiveness (Cheng et al., 2023)^[2]

Overall, this study extends previous research by integrating collaborative learning, personalized learning pathways, artificial intelligence, and VARK learning styles into a unified instructional framework for MOOCs. The proposed Adaptive MOOC Teaching Model provides both theoretical and practical guidance for designing learner-centered online learning environments that improve learning engagement, learning satisfaction, and academic achievement in higher education. This integrated framework also offers practical implications for universities and MOOC platform developers seeking to enhance the quality and effectiveness of digital learning.

9. ORIGINALITY AND BODY OF KNOWLEDGE

Table 5

Originality and Body of Knowledge of the Proposed MOOC Teaching Model

Research Components	Empirical Findings	New Body of Knowledge
Collaborative Learning	Collaborative learning significantly improved academic achievement, learning engagement, and learning satisfaction through knowledge sharing, peer interaction, and peer assessment.	Collaborative learning serves as the foundation for enhancing interaction and learner engagement in MOOC environments.
Personalized Learning Pathways	AI-powered recommendation mechanisms and dynamic content adaptation improved learning efficiency and learner motivation.	Personalized learning pathways enable adaptive learning experiences that accommodate individual learner needs.
VARK Learning Styles	Learning styles significantly moderated the relationships between collaborative learning, personalized learning pathways, and learning outcomes.	VARK learning styles function as a moderating mechanism that enhances the effectiveness of adaptive online learning.
Integrated MOOC Teaching Model	The integration of collaborative learning, personalized learning pathways, AI-supported adaptive learning, and VARK learning styles improved overall learning outcomes.	The study proposes an Adaptive MOOC Teaching Model that integrates collaborative learning, personalized learning, artificial intelligence, and learning style adaptation to improve learning engagement, learning satisfaction, and academic achievement in higher education.

10. RESEARCH RECOMMENDATIONS

1. Implication of the Study

The findings of this study provide important implications for the development of MOOC-based instruction in higher education. The integration of collaborative learning, personalized learning pathways, artificial intelligence, and VARK learning styles offers a practical framework for designing adaptive and learner-centered online learning environments. The proposed instructional model can assist instructors, curriculum designers, and MOOC platform developers in improving learner engagement, learning satisfaction, and academic achievement. Furthermore, the findings support the application of adaptive

learning technologies to accommodate diverse learner characteristics and promote more effective digital learning experiences

2. Recommendations for Future Research

Future studies should expand the sample to include students from different universities, academic disciplines, and educational contexts in order to enhance the generalizability of the findings. Comparative studies across countries and different MOOC platforms are also recommended to examine the effectiveness of adaptive instructional models in diverse learning environments. In addition, future research should investigate the application of emerging technologies, such as generative artificial intelligence, learning analytics, and intelligent tutoring systems, to further improve personalized learning pathways and collaborative online learning in higher education.

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