



Research on Curriculum Design and Student Participation in Blended Teaching Model

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Abstract. This study employs a mixed-methods research approach to delve into the impact of curriculum design on student participation in blended learning environments. By developing a theoretical framework that connects elements of curriculum design with dimensions of student participation, and integrating quantitative and qualitative research methods, this study systematically analyzes the influence of factors such as course interactivity, teaching methods, and learning environment comfort on student participation, using a sample of Chinese college students. The research finds that the attractiveness, flexibility, and technical support of course content are also key factors affecting student participation. This paper discusses the limitations of the study and suggests directions for future research, aiming to provide new perspectives on curriculum design and student participation research under the blended teaching model. The results emphasize the importance of individual differences in curriculum design and propose a series of strategies to enhance student participation, thereby improving teaching effectiveness in blended learning environments.

Keywords: Blended Teaching, Curriculum Design, Student Participation, Mixed-Methods Research, Educational Technology, Higher Education

1 Introduction

Blended Learning combines traditional and online education to provide a flexible, personalized experience, with success dependent on technology, curriculum design, and student engagement [1]. This study addresses how curriculum design can enhance student participation in blended learning, a critical determinant of learning motivation and behavior [2]. It evaluates the synergy between online and offline activities and technological tools that promote active learning and interaction. Student participation, gauged by class and online engagement, is essential for evaluating teaching effectiveness [3].

While prior research covers blended teaching broadly, it often overlooks the relationship between curriculum design and student participation. This empirical study fills this gap by exploring the impact of curriculum design on student engagement in blended learning and proposing corresponding strategies and recommendations.

Employing a quantitative approach with questionnaires and regression analysis, the study includes a diverse sample of Chinese college students to ensure broad applicability. The analysis aims to offer theoretical and practical guidance for curriculum design and teaching in blended learning environments.

2 Literature Review

As a form of educational innovation, blended teaching model has received extensive attention in recent years. This part summarizes the related research on blended teaching model, curriculum design and student participation, aiming at providing theoretical basis and research background for this study.

2.1 Overview of Blended Teaching Model

Blended Learning enhances educational quality by integrating traditional and online instruction, capitalizing on technology. Initially, IT was a supplementary tool for face-to-face teaching, with blended learning being a combination of offline and computer-assisted online learning. Over time, the physical aspects of blended learning became less critical, shifting focus to teaching characteristics and emphasizing technological interaction and integration. Bliuc et al. highlight that blended learning introduces a new paradigm, integrating interactions among students, teachers, and resources both on-site and online [4]. This phase emphasizes interaction, viewing blended teaching as a pedagogical reform and redesign process. With the rise of the internet-plus era, blended learning has evolved into a scenario based on mobile communication, online learning environments, and classroom discussions [5]. The model has advanced from technology application to "internet plus" education, improving student experiences and outcomes. The core of blended teaching is the fusion of traditional and online learning to enhance teaching effects, using IT to create innovative teaching environments, fostering teacher-student interaction, and nurturing autonomous learning [6].

2.2 Curriculum Design Under the Blended Teaching Model

Blended Learning focuses on the structured design and implementation of teaching activities, with teachers facilitating as organizers and designers to guide student learning [7]. This method emphasizes the creation and integration of diverse teaching resources and employs various assessment methods to gauge student learning [8].

Curriculum design in blended learning is characterized by clear objectives, organized content, activity design, and comprehensive evaluation. It prioritizes student-centeredness, addressing individual needs and learning styles by integrating online and offline resources to foster effective communication and student development [9]. Inquiry-based learning and task-oriented activities are optimized to boost student engagement and outcomes. Teachers integrate online and offline resources,

using digital platforms to encourage discussion, cooperation, and interaction, thereby creating a collaborative learning community [10].

Content organization in blended learning is tailored to students' backgrounds and characteristics for effective learning absorption and application. A variety of teaching activities, including case studies, discussions, and projects, are essential for engaging student interest and potential [11]. Evaluation methods should be diverse, encompassing exams, homework, group projects, and personal reports, to assess both learning achievements and practical skills.

For blended teaching to be successful, effective curriculum design is essential, necessitating clear objectives, rich resources, and activities that encourage student participation. Research highlights the significance of diverse online resources and the promotion of student engagement through in-person activities such as case reports and group discussions.

2.3 Student Participation

Student participation is a critical metric for teaching effectiveness, impacting academic performance, mental health, and career development. In blended learning, teachers' instructional design skills are pivotal to fostering active student engagement, particularly through the creation of effective learning tasks and activities [12]. Task design influences student behavior, emotion, and cognition; well-crafted tasks can boost interest and enhance learning engagement and cognitive investment. The structure of classroom content significantly affects participation; teachers must thoughtfully design the teaching process, organize content, and foster a conducive classroom environment to stimulate student involvement [13]. Learner support is also crucial for emotional participation; teachers' supportive actions can fulfill psychological needs, thereby enhancing motivation and attitudes towards learning [14].

2.4 Curriculum Design and Student Participation in Blended Teaching.

In the blended learning environment, student participation is influenced by curriculum design, teacher interaction, and technical support [15]. Teachers' support, expectations, and interactions significantly enhance student motivation and engagement. Emotional and ability support from teachers are particularly impactful on student participation. Curriculum design is integral to blended learning, which combines face-to-face and online elements to offer a flexible learning experience [16]. Effective curriculum structure and interactive activities can markedly improve student participation and learning outcomes. Key features of curriculum design include organization, learning objectives, evaluation, interpersonal interaction, and technology application, ensuring effective content delivery and an optimized learning experience [17]. Teachers utilize platforms like Moodle to provide pre-recorded lectures, discussions, and tests, enhancing the learning experience. The effectiveness of blended teaching relies on accurate curriculum design and implementation. Teachers must maintain continuity between online and offline teaching to provide a consistent learning experience.

2.5 Research Hypothesis

H1: Interactivity in blended curriculum design positively correlates with student participation.

H2: Flexibility in blended curriculum design positively correlates with student participation.

H3: Technical support in blended curriculum design positively correlates with student participation.

H4: Teaching methods employed in blended learning positively influence student participation.

H5: The appeal of blended course content positively influences student participation.

H6: The comfort of the blended teaching and learning environment positively influences student participation.

3 Research Method

3.1 Research Design

This study adopts a mixed research method and focuses on Chinese university students who have experienced blended learning. Firstly, quantitative research methods. The data was collected through a questionnaire survey distributed on an online platform. The questionnaire is divided into two parts: the first part collects demographic information of the respondents (gender, age, research field, and education level), and the second part uses a 5-point Likert scale (1=very different, 5=very agree) to evaluate course design and student participation. The course design is evaluated from six dimensions, each with three questions covering the attractiveness of the course content, the interactivity of the course, the flexibility of the course, technical support, the teaching methods of the teacher, and the comfort of the learning environment. Student engagement is measured through six questions, including classroom engagement, homework/project engagement, and online discussions.

Secondly, quantitative research methods are adopted. Using semi-structured interview method to gain a deeper understanding of how individual differences affect students' participation and learning experience. The interview is conducted from four aspects: learning personal background information, learning motivation and goals, learning styles and preferences, course design and participation.

The sample of this study is mainly focused on Chinese university students. Future research can consider including students from different regions and educational backgrounds to enhance the representativeness and universality of the research results. This may involve cross-border data collection and comparative analysis of student engagement across different cultural backgrounds.

3.2 Research Conclusions

The research is distributed to colleges and universities all over the country in China. Considering the efficiency problem, the online distribution is carried out by using the test paper star platform. 400 questionnaires were distributed, and 400 questionnaires were recovered. Excluding short answer time, incomplete information and more than 80% answers for the same option and questionnaire, 380 valid questionnaires were recovered. The survey sample is representative across gender, age, subject field, and education level, ensuring high credibility of the research findings. The gender distribution is balanced, with the majority of respondents aged 18-23. The variety in disciplines and academic levels enriches the data, providing a robust basis for examining the impact of curriculum design on student participation in blended learning.

The interview method adopts a semi-structured interview, which lists an interview outline consisting of 4 parts and 8 questions. Using telephone interviews as the main method, 50 students from a university in Shanghai who have received blended learning were selected for the study. Subsequently, the interview recording will be transcribed into text, and the text will be encoded and classified to extract key information and themes.

Descriptive Statistical Analysis of Samples. In order to fully understand the influence of curriculum design on students' participation in blended teaching model, this study quantitatively analyzes seven key variables to evaluate their current situation.

The survey results indicate that course content attractiveness ($M = 3.258$, $SD = 0.992$), interactivity ($M = 3.322$, $SD = 0.986$), flexibility ($M = 3.413$, $SD = 0.998$), technical support ($M = 3.368$, $SD = 0.996$), teaching methods ($M = 3.32$, $SD = 1.045$), and learning environment comfort ($M = 3.343$, $SD = 1.053$) all received moderate average scores, suggesting a generally positive perception of the blended learning curriculum. Student participation ($M = 3.263$, $SD = 1.043$) also rated at a medium level. Standard deviations were moderate across all variables, indicating score dispersion was relatively small without extreme values. Kurtosis and skewness values were near zero, confirming a normal distribution without significant skew or peak phenomena. These findings provide a robust dataset for analyzing the impact of curriculum design on student participation in blended learning environments.

Reliability and Validity Test. In order to ensure that the data information of the sample can reflect the scientificity and validity of the survey, it is necessary to verify that the survey samples collected by screening are credible and effective through reliability test and validity test.

To ensure the scientific validity of the survey, reliability and validity assessments were conducted. All item-scale correlations (CITC values) exceeded 0.4, indicating strong item convergence. The Cronbach's Alpha for the entire scale was 0.936, with all subscales above 0.8, suggesting high internal consistency and scale reliability. No items were removed as the alpha coefficient did not significantly increase upon their deletion, confirming the retention of all items.

Validity assessment is crucial for evaluating the accuracy of measurement tools. It encompasses content and structural validity. Content validity was established through expert consultation, with 10 experts in blended curriculum teaching reviewing and revising the questionnaire. Structural validity was assessed using exploratory factor analysis (EFA), with the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity determining suitability for factor analysis. KMO is 0.925, which is greater than 0.6, which meets the prerequisite requirements of factor analysis, which means that the data can be used for factor analysis research. The data passed the Bartlett sphericity test ($p<0.05$), which indicated that the research data was suitable for factor analysis.

The common factor is extracted by principal component analysis, and orthogonal rotation is carried out by maximum variance method. The total variance and rotation component matrix of the explanation are as follows.

A total of seven factors were extracted from factor analysis, and the characteristic root values were all greater than 1. The variance interpretation rates of these seven factors after rotation were 17.784%, 9.624%, 9.598%, 9.451%, 9.420%, 9.171% and 9.137%, respectively, and the cumulative variance interpretation rate after rotation was 74.186%. Seven factors can better express the contents of 24 variables in the questionnaire, which is enough to describe the overall characteristics of the questionnaire.

The factor load coefficient of each measurement item is greater than 0.5, and the cross load coefficient is less than 0.4, which shows that the seven selected factors are well representative, and each item falls into the corresponding factor, so the scale has good structural validity.

Regression Analysis of Student Participation. Multiple regression analysis assumes the absence of multicollinearity among variables. A multiple collinearity test was conducted to verify the regression analysis suitability for variables including curriculum content attractiveness, interactivity, flexibility, technical support, teaching methods, learning environment comfort, and student participation. The correlation matrix is presented in Table 1.

Table 1. Person correlation coefficient matrix

	Student participation	Course content attraction	con-Curriculum interaction	Curriculum flexibility	technical support	Teachers' teaching methods	Comfort learning environment	of envi-
Student participation	one							
Course content attraction	0.464**	one						
Curriculum interaction	0.520**	0.439**	one					
Curriculum flexibility	0.452**	0.348**	0.414**	one				
technical support	0.435**	0.345**	0.379**	0.408**	one			
Teachers' teaching methods	0.523**	0.451**	0.405**	0.456**	0.444**	one		

	Student participation	Course content attraction	con-Curriculum interaction	Curriculum flexibility	technical support	Teachers' teaching methods	Comfort of learning environment	of envi-
Comfort of learning environment	0.488**	0.404**	0.479**	0.400**	0.405**	0.423**	one	

* $p < 0.05$ ** $p < 0.01$

Significant positive correlations were found between student participation and various aspects of curriculum design, including content attractiveness ($r = 0.464$, $p < 0.01$), interactivity ($r = 0.520$, $p < 0.01$), flexibility ($r = 0.452$, $p < 0.01$), technical support ($r = 0.435$, $p < 0.01$), teaching methods ($r = 0.435$, $p < 0.01$), and learning environment comfort ($r = 0.435$, $p < 0.01$).

Linear regression analysis was carried out for each variable, and the model formula was: student participation = $0.055 + 0.144 \times$ course content attraction + $0.226 \times$ course interaction + $0.122 \times$ course flexibility + $0.109 \times$ technical support + $0.211 \times$ teacher's teaching method + $0.151 \times$ comfort of learning environment, with an R^2 of 0.458, indicating that 45.8% of the variation in student participation is explained by these six independent variables. The model was significant ($F = 52.466$, $p = 0.000 < 0.05$), suggesting that at least one independent variable significantly influences student participation. The model's VIF values were all below 5, indicating no multicollinearity, and the D-W statistic was approximately 2, indicating no autocorrelation. Regression analysis results are detailed in Table 2.

Table 2. Results of Linear Regression Analysis (n = 380)

	Non-standardized coefficient		Standardization coefficient		t	p	Collinear diagnosis	
	B	Standard error	Beta				VIF	tolerance
constant	0.055	0.189	-		0.292	0.771	-	-
Course content attraction	0.144	0.048	0.137		2.984	0.003**	1.448	0.691
Curriculum interaction	0.226	0.050	0.214		4.515	0.000**	1.542	0.648
Curriculum flexibility	0.122	0.048	0.116		2.522	0.012*	1.463	0.684
technical support	0.109	0.048	0.104		2.281	0.023*	1.428	0.700
Teachers' teaching methods	0.211	0.048	0.211		4.385	0.000**	1.594	0.627
Comfort of learning environment	0.151	0.047	0.153		3.244	0.001**	1.527	0.655
R^2	0.458							
Adjust R^2	0.449							
F	$F(6,373) = 52.466, p = 0.000$							
D-W value	2.165							

Remarks: Dependent variable = student participation

* $p < 0.05$ ** $p < 0.01$

Regression coefficients indicated significant positive impacts on student participation for course content attraction ($\beta = 0.144$, $t = 2.984$, $p < 0.01$), supporting H5; curriculum interactivity ($\beta = 0.226$, $t = 4.515$, $p < 0.001$), supporting H1; curriculum flexibility ($\beta = 0.122$, $t = 2.522$, $p < 0.05$), supporting H2; technical support ($\beta = 0.109$, $t = 2.281$, $p < 0.05$), supporting H3; teachers' teaching methods ($\beta = 0.211$, $t = 4.385$, $p < 0.001$), supporting H4; and learning environment comfort ($\beta = 0.151$, $t = 3.244$, $p < 0.01$), supporting H6.

= 4.385, $p < 0.001$), supporting H4; and learning environment comfort ($\beta = 0.151$, $t = 3.244$, $p < 0.01$), supporting H6.

Interview Analysis. Through open coding of interview data, we identified that students' intrinsic motivation (such as interests and personal growth) and extrinsic motivation (such as grades and employment prospects) are the two main factors affecting participation. Through axial encoding, we found that students with strong intrinsic motivation tend to participate more actively in learning activities, while extrinsic motivation may increase participation in the short term, but may not be as persistent as intrinsic motivation. If students can clearly express their learning goals, they often exhibit higher levels of participation. The consistency between students' goals and course objectives has a significant impact on their participation. When students believe that the course aligns with their personal goals, they are more likely to actively participate.

Open coding displays diverse learning styles among students, including visual, auditory, and hands-on operations. Axial encoding further reveals how these styles affect their adaptation and participation in blended learning environments. Selective coding highlights the importance of matching student preferences with course design. For students who prefer self-directed learning, providing flexible learning paths and self-paced courses can increase their engagement. Students have a significant demand for adaptability and flexibility in the curriculum. For students who require additional support or different learning resources, course design should provide personalized learning options.

Identifying interactivity in course design through open coding is a key factor in increasing student engagement. Axial coding shows that group discussions, online forums, and other interactive activities can promote communication and collaboration among students, thereby increasing participation. Selective coding reveals that the attractiveness of course content has a significant impact on students' learning motivation. The frequency, relevance, and presentation of content are important factors that affect student engagement. A flexible curriculum structure can meet the learning needs of different students. Providing multiple learning paths and self-paced learning options can increase student engagement, especially for those who require flexibility to balance learning and other life responsibilities.

4 Research Conclusion

This study delves into the relationship between curriculum design and student participation in blended learning environments, revealing that course interactivity, teaching methods, and the comfort of the learning environment are key factors significantly impacting student engagement. To enhance student participation, a range of strategies have been proposed, including increasing group discussions and real-time Q&A to boost course interactivity, employing diverse teaching methods such as flipped classrooms and project-based learning, ensuring the comfort and suitability of both physical and online learning environments, and regularly updating course content with

multimedia techniques to enhance its attractiveness. Additionally, offering a variety of learning paths and self-paced courses can accommodate different learning styles, while robust technical support and regular equipment updates can meet the evolving demands of education. The study also emphasizes the importance of integrating online and offline teaching activities and suggests using data analysis to monitor and refine the blended learning model. The implementation of these strategies aims to create a more interactive, flexible, and engaging learning environment, thereby improving student participation and learning outcomes in blended learning. The findings indicate that students' learning motivation and goals, learning styles and preferences, and course design and engagement are interrelated, with these factors collectively affecting student participation and learning experience in blended learning environments. Therefore, educators need to consider these individual differences when designing courses to meet diverse needs and promote increased student engagement.

5 Research Summary and Prospect

This study quantitatively examines the link between course design and student engagement in blended learning environments, identifying key factors such as course interaction, teaching methods, and learning environment comfort that significantly influence student participation. Regression analysis reveals that curriculum content attractiveness, flexibility, and technical support also play crucial roles. The study offers practical curriculum design recommendations to enhance student engagement and improve teaching outcomes.

The findings contribute to the theoretical understanding of curriculum design's impact on student participation in blended learning and provide educational practitioners with strategies to optimize course design and enhance student learning experiences.

For future research, it is recommended to:

1. **Expand Sample Range:** Include a more diverse group of students and teachers from various regions and disciplines to enhance the representativeness of the findings. Future research should explore how cultural differences affect students' engagement in blended learning environments. This may include comparative research on student engagement across different cultural backgrounds, as well as in-depth analysis of how curriculum design can adapt to different cultural needs.

2. **In-Depth Analysis of Influencing Factors:** Further investigate student personal characteristics alongside curriculum design.

3. In order to better understand how teachers can enhance student engagement through the use of teaching skills and technological tools, future research could include surveys of teachers and classroom observations. This will help reveal the best practices of teachers in blended learning environments and provide guidance for teacher training and professional development.

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