

Research on the Theoretical Framework of Student Engagement in Blended Learning Mode

Chen Yang

College of Engineering, Northeastern University, Boston, 02115, USA

Abstract. The theoretical framework of student engagement in blended learning models is what this paper aims to explore. Against the backdrop of the rapid development of information technology and the continuous innovation of educational concepts, blended learning has become a topic of great concern in the current field of education. However, how to effectively enhance student engagement in this new learning model remains an urgent problem to be solved. This study constructs a comprehensive theoretical framework through literature analysis, case studies, and empirical investigations to gain an in-depth understanding of the multiple factors influencing student engagement, which includes three dimensions of cognitive engagement, emotional engagement, and behavioral engagement, and takes into account key elements such as technology acceptance, teaching design, social interaction, and self-regulation. The study shows that for blended learning to be effective, both online and offline environments need to create diverse learning experiences, promote teacher-student interaction and student-student interaction, provide personalized learning support, and cultivate students' autonomous learning ability. The theoretical framework of this paper can provide educators and researchers with a systematic perspective to help them design and implement more effective blended learning strategies to enhance student engagement and learning outcomes. Future research can further explore the specific applications of different disciplines and different educational stages, as well as the impact of technological innovation on student engagement.

Keywords: Blended Learning; Student engagement; Theoretical framework; Instructional design; Self-directed learning.

1. Introduction

The rapid development of information technology and the continuous innovation of educational concepts have made blended learning a topic of great concern and research focus in the field of education today. This teaching model, which combines the advantages of traditional face-to-face teaching and online learning, brings new opportunities and challenges to educational practice. However, under this new learning model, how to effectively enhance student engagement remains an important issue for educators and researchers.

Blended learning has made significant progress in the education sector in recent years. Data from the National Institute of Education Sciences of China shows that the market size of blended learning in China is expected to grow at an annual rate of 20% from 2020 to 2024, and the proportion of courses using blended teaching in higher education institutions across the country has reached more than 60% in 2023. This indicates that blended learning is widely applied and has great potential in the field of education.

As blended learning becomes more widespread, the problem of student engagement becomes more prominent. Studies have shown that student engagement in blended learning environments fluctuates more and is more uncertain compared to traditional classroom teaching, and a national survey in 2022 indicated that approximately 45% of students do not engage enough in blended learning, which directly affects learning outcomes and teaching quality.

The theoretical framework of student engagement in the blended learning model is worthy of in-depth study because it is both of great theoretical significance and can guide educational practice and improve teaching effectiveness. Therefore, this study intends to systematically analyze the conceptual characteristics of blended learning and the theoretical basis of student engagement, construct a comprehensive theoretical framework, and thereby gain a deeper understanding of the multiple

factors influencing student engagement. To provide a theoretical basis and practical guidance for enhancing student engagement in a blended learning environment.

2. Concepts and Characteristics of Blended Learning Models

2.1 Definition of the Blended Learning Model

A blended learning model that integrates traditional face-to-face classroom teaching with online learning, aiming to maximize the advantages of both learning modes to create a more flexible, personalized and efficient learning experience for students. And the integration of online and offline teaching resources, learning activities, and interaction methods through blended learning extends time and space, thus breaking the limitations[14] of traditional education.

In blended learning, online platforms are available for students to access learning materials, participate in discussions and complete assignments, and face-to-face classroom environments allow students to have in-depth communication and practice with teachers and classmates. This model not only enhances the flexibility and accessibility of learning, but also helps develop students' autonomous learning ability and critical thinking.

2.2 Key features of the Blended Learning model

The blended learning model has the following main features:

Diversified learning environment: Combining online and offline learning scenarios to provide students with diverse learning experiences.

Personalized learning: With technical support, personalized learning content and feedback can be provided based on students' learning progress and needs.

Flexibility and autonomy: Students can learn according to their own time planning and learning pace, thereby enhancing learning autonomy.

Strong interactivity: Online discussions, collaborative projects, etc. are used to promote interaction between teachers and students as well as among students.

Abundant resources: A variety of digital learning resources, such as video, audio, and interactive courseware, are integrated to enrich the learning content.

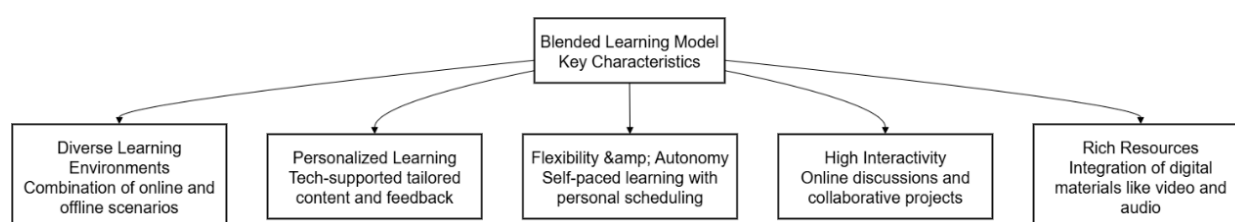


Figure 1. Key features of the blended learning model

2.3 The current application of blended learning models in education

In recent years, the application of blended learning in education has become increasingly widespread. According to statistics from the Ministry of Education, in 2023, the proportion of courses adopting blended teaching in higher education institutions across the country exceeded 60%, and the growth trend of blended learning in K-12 education has also been rapid, and its application has been particularly widespread during the pandemic.

Blended learning is now mainly being applied in the following areas: Higher education curriculum reform has relied on it to enhance teaching quality and student engagement, it has provided flexible learning opportunities for working learners in vocational and continuing education, it has been used for personalized learning and after-school tutoring in basic education, and massive open online courses (MOOCs) have also been combined[5] with traditional classrooms.

Blended learning faces challenges such as an unbalanced technological infrastructure, varying digital teaching capabilities among teachers, and the development of students' autonomous learning abilities, which need to be further explored and addressed in future research and practice.

3. The theoretical basis of student engagement

3.1 Definition of Student engagement

The degree of time, energy, resources that students invest in the learning process, as well as their emotional and cognitive input into learning activities, is known as student engagement. This is one of the key indicators for measuring the quality and effectiveness of students' learning. In a blended learning environment, this concept is more complex and diverse because it not only encompasses the participation in traditional classrooms It also involves interaction and engagement in the online learning environment [15].

Although scholars have different definitions of student engagement, they mostly view it as a multi-dimensional construct, as Fredricks et al. proposed in 2004 that student engagement can be divided into three dimensions: behavioral engagement, emotional engagement, and cognitive engagement, and in the context of blended learning, The concept may also include technical engagement, social engagement and the like.

The degree of initiative, enthusiasm and engagement of students in learning is reflected by student engagement, which is a key factor [1] influencing learning outcomes.

3.2 Main dimensions of student engagement

Student engagement typically includes the following main dimensions:

Behavioral engagement: Some actual participation by students in learning activities, such as attendance, homework completion, and participation in class discussions.

Emotional engagement: Students' interests, attitudes, and emotional responses are all involved in learning, including learning motivation, learning interest, and a sense of belonging to the school.

Cognitive engagement: The depth to which students think while learning and how well they use strategies such as critical thinking and metacognitive strategies fall within the scope[4] of cognitive engagement.

Social engagement: The extent to which students interact and collaborate with teachers and classmates in a blended learning environment is reflected [13] by this dimension.

Technical engagement: The level of student engagement and technical proficiency when using online learning platforms and tools specifically refers to this.

3.3 Key factors influencing student engagement

In a blended learning environment, the factors influencing student engagement are more complex and diverse, mainly reflected in the following aspects:

Personal factors: Students' learning motivation, self-efficacy, learning style and technical literacy are all factors that need to be considered.

Instructional design: The design of curriculum content, the arrangement of learning activities, the selection of assessment methods, etc. are all included.

Technical factors: The ease of use, functionality and stability of the online learning platform, etc.

Social interaction: The quality and frequency of teacher-student interaction and student-student interaction.

Learning environment: Design physical environments (such as classroom facilities) and virtual environments (such as online learning communities).

Institutional support: Resources, policies, and technical support provided by a school or educational institution.

Family factors: The extent to which families support blended learning and the provision of learning conditions.

Research shows that students' engagement in a blended learning environment is influenced by a variety of complex interacting factors, so enhancing student engagement requires multi-dimensional comprehensive consideration and systematic strategies [10].

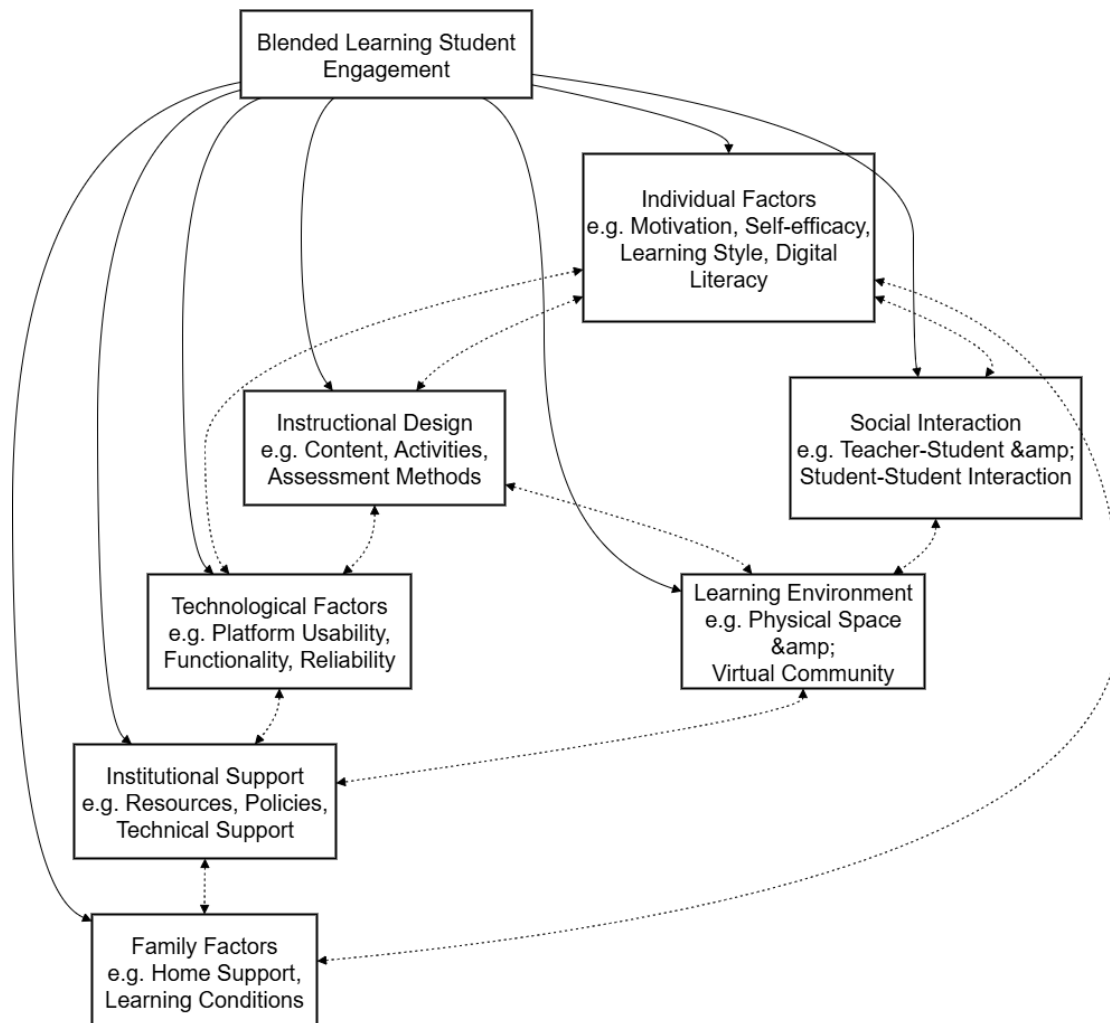


Figure 2. Key factors Influencing Student Engagement in a Blended Learning Environment

4. Construction of a Theoretical framework for Student Engagement in Blended Learning Models

4.1 Basic components of the theoretical framework

The theoretical framework of student engagement in the blended learning model is rather complex and multi-dimensional and multi-level. After an in-depth analysis of existing literature and empirical research results, this study proposes a comprehensive theoretical framework that includes five interrelated and interacting core dimensions: cognitive engagement, emotional engagement, behavioral engagement, social engagement, and technical support. These five dimensions together form the overall structure of student engagement.

The depth and breadth of students' thinking in the learning process are reflected by cognitive engagement, and students' attitudes towards learning and emotional engagement are manifested by emotional engagement, behavioral engagement focuses on students' specific actions and performance in learning activities, and social engagement emphasizes interaction and collaboration between students and teachers and peers. The technical support dimension takes into account the impact of technology on student engagement in blended learning Settings, a theoretical framework that covers

engagement elements in traditional classroom teaching while focusing on unique elements in online learning Settings, providing a theoretical basis[11] for a comprehensive understanding and enhancement of student engagement in blended learning.

4.2 Analysis of the cognitive Engagement dimension

The core dimension of the theoretical framework of student engagement in blended learning models includes cognitive engagement, which focuses on students' thinking activities, knowledge construction, and deep understanding during learning. Cognitive engagement is reflected in the process of students actively thinking, analyzing problems, and constructing knowledge systems in blended learning environments.

Specifically, cognitive engagement covers the following aspects: First, the degree to which students understand the learning content, which involves grasping concepts, comprehensiveness of principles, and the ability to apply knowledge; second, students' critical thinking ability, that is, the ability to question, evaluate, and reflect on what they have learned; third, students' creative thinking, which includes the ability to come up with new ideas and solve complex problems; fourth, A student's metacognitive ability, that is, the monitoring and regulation of their own learning process.

In blended learning, the flexible use of online resources combined with in-depth offline discussions can effectively promote students' cognitive engagement, just as online video learning combined with interactive tests can enable students to master basic knowledge, while face-to-face group discussions and project practices can deepen understanding and cultivate higher-order thinking abilities.

4.3 Analysis of the dimension of emotional engagement

The emotional engagement dimension plays a crucial role in the theoretical framework of student engagement in blended learning models. It focuses on students' emotional attitudes, interest levels, and motivation intensity during the learning process, and in blended learning environments, active emotional engagement can significantly enhance learning outcomes and sustainability[9].

Specifically, emotional engagement takes many forms, such as students' interest and enthusiasm for learning content, enjoyment of the learning process, emotional connection with the course and teachers, strong learning motivation, and confidence and sense of achievement during learning, and emotional engagement is even more important in blended learning. Because students need to maintain continuous learning motivation in both online and offline environments.

If educators want to enhance emotional engagement, they can adopt the following strategies Design attractive online learning resources such as interactive multimedia, create a positive learning atmosphere in the offline classroom to encourage students to express their thoughts and emotions actively, provide timely feedback and encouragement to boost students' confidence, and design personalized learning paths to meet the interests and needs of different students. Also use online communities and discussion platforms to strengthen emotional connections among students and build supportive learning environments.

4.4 Analysis of behavioral engagement dimensions

An important component of the theoretical framework of student engagement in blended learning models includes the behavioral engagement dimension, which focuses on the specific actions of students during learning and the observable parts of the engagement behavior. In a blended learning environment, the extent to which students actively engage in both online and offline learning activities reflects behavioral engagement.

The degree of students' learning engagement can be reflected by specific manifestations of behavioral engagement such as the frequency and duration of logging in to online learning platforms, browsing and downloading of online course resources, engagement in online discussions and interactions, in-person classroom attendance, frequency of speaking and asking questions in class, level of participation in group activities, and completion of assignments, which are behavioral indicators that can directly reflect the degree of students' learning engagement.

In blended learning, the following strategies can be used to increase behavioral engagement: Design diverse learning activities such as quizzes, virtual experiments, and group projects to engage students continuously, establish a clear learning progress tracking system to help students monitor their own learning behavior, and set up appropriate reward mechanisms to encourage students to actively participate in both online and offline activities. In addition, use data analysis techniques to identify students with low engagement in a timely manner and provide personalized support and intervention.

4.5 Analysis of dimensions of social engagement

In the theoretical framework of student engagement in blended learning models, the social engagement dimension holds a significant position, with a focus on interaction and collaboration between students and teachers and peers, which is particularly crucial in blended learning Settings where learning is no longer confined to traditional classrooms but extends to virtual Spaces.

Specifically, social participation has many manifestations, such as the frequency and quality of students' communication in online discussion forums, their participation in online collaborative projects, the role they play and their contributions in virtual learning communities, the extent of their participation in offline group discussions and collaborative learning, and the state of interaction and communication with teachers. If the level of social participation is high, it not only benefits knowledge co-construction but also deepens understanding. It can also enhance students' sense of belonging and motivation to learn.

To enhance social engagement, the following strategies can be adopted: Design learning tasks that require collaboration, such as online group projects or problem-solving challenges, create virtual learning communities to encourage students to share resources and exchange ideas, use social media tools to strengthen connections between teachers and students as well as among students, arrange sufficient group discussion and interaction sessions in offline classrooms, and cultivate students' online social skills, Such as effective communication, cooperation and conflict resolution skills, etc.

4.6 Analysis of technical support dimensions

In the theoretical framework of student engagement in blended learning models, the technical support dimension is a key component. This part focuses on the support and impact of technical factors such as learning management systems, online learning platforms, and digital tools on student engagement. In blended learning environments, technology is not only a medium for knowledge transmission, It is also a key means[3] to drive interaction, facilitate personalized learning, and facilitate data analysis.

There are some specific manifestations in terms of technical support, such as the ease of use and functionality of the learning management system, the ease of access and interactivity of online learning resources, the convenience of mobile learning applications, the usefulness of virtual experiments and simulation tools, the effectiveness of the learning data analysis and feedback system, etc. If the quality of technical support is high, It can significantly increase student engagement and reduce frustration caused by technical barriers.

The following measures can be taken to enhance technical support: Select or develop user-friendly learning platforms that allow students easy access and use, and provide a variety of digital learning resources such as interactive videos, online quizzes, virtual LABS, and use artificial intelligence technology to give personalized learning advice and immediate feedback. In addition, establish a complete technical support service to quickly solve problems students encounter when using it, and finally collect students' feedback on the use of technology regularly to continuously optimize and update the learning system.

4.7 Application and Evaluation of the theoretical framework

In the context of blended learning, the student engagement theory framework is proposed in this study, so to ensure its practical effectiveness, the key lies in applying and evaluating this framework,

as it is used to guide educators in designing and implementing more effective blended learning strategies, and evaluation is an important means[12] of verifying the effectiveness of the framework and continuously improving it.

At the application level, educators can design complete learning activities and assessment programs based on this theoretical framework, such as considering cognitive, emotional, behavioral, social, and technical support dimensions in curriculum design to ensure the comprehensiveness of the learning experience, and adopting corresponding strategies for different dimensions in teaching practice, Such as using challenging tasks to drive cognitive engagement, emotional support to enhance emotional engagement, diverse activities to boost behavioral engagement, collaborative projects to increase social engagement, and optimized technical platforms to provide comprehensive support[7].

A variety of methods can be used in the assessment, such as qualitative means like questionnaires and interviews to explore students' subjective experiences, data from learning platforms to analyze students' online behaviors, cognitive engagement based on learning outcomes, social engagement based on social network analysis, and long-term follow-up studies to understand the applicability of the framework in different periods and disciplines, Continuous assessment and feedback can improve the theoretical framework to better adapt to various educational environments and needs.

5. Conclusions

The theoretical framework of student engagement in blended learning models was constructed by this study, which provides a systematic theoretical basis and practical guidance for in-depth understanding and effective enhancement of student engagement in blended learning environments, covering five core dimensions: cognitive engagement, emotional engagement, behavioral engagement, social engagement, and technical support. It can fully reflect the multiple factors that affect student engagement in blended learning.

Research shows that for blended learning to be effective, these five dimensions need to work in tandem, designing learning activities that stimulate deep thinking and knowledge construction at the cognitive level, creating a positive learning atmosphere and providing emotional support at the emotional level, and encouraging students to actively participate in various online and offline learning activities at the behavioral level, Social interaction between teachers and students and collaboration among students can enhance the learning experience, and technical support provides users with a friendly and digitally rich learning platform to ensure the smooth progress of learning.

Proposing such a theoretical framework is of great significance to educational practice, as it provides educators with a comprehensive dimension to consider when designing and implementing blended learning to help create more effective learning environments, and the framework also points the way for future research. Areas such as exploring specific applications in different subjects, different educational stages, and the impact of technological innovation on student engagement are all points it points to.

It should be noted that there are differences in educational backgrounds and student characteristics, which need to be taken into account when applying this framework, and future research can further validate and refine this theoretical framework, explore the mechanisms of interaction among various dimensions, and also explore its applicability in different educational contexts. Overall, This study provides important theoretical support for improving blended learning outcomes and student engagement, and is expected to promote the innovative development of blended learning in the field of education.

References

- [1] Ifnaldi, Juanda, Afnita, Andi Fatimah Yunus, Iswan Afandi. Integrating Digital and Hybrid Learning Models in Environmental Literature Education: Enhancing Speaking Skills Through Virtual Platforms in the Digital Era[J]. Journal of Language Teaching and Research, 2025 (5).

- [2] Thamir Hamad Alaskar. Data-driven innovation and innovation ambidexterity for sustaining firm resilience: the mediating role of BA capabilities and digital culture[J]. *Discover Sustainability*, 2025, 6(1):
- [3] Unleashing the power of green innovations: the role of organizational ambidexterity and green culture in achieving corporate sustainability[J]. *European Journal of Innovation Management*, 2025, 28(6).
- [4] Yumei Ma, Roderick Julian Robillos. Effect of Blended Learning Approach on ESL Students' Hotel English Service Skills and Attitudes towards Active Learning[J]. *Forum for Linguistic Studies*, 2025, 7(8).
- [5] Zhi Li, Fang Fang. Constructing an adaptive blended teaching model through big data analytics and machine learning[J]. *Journal of Computational Methods in Sciences and Engineering*, 2025, 25(5).
- [6] Xiaoliang Zhang, Jinjin Jiang, Zuxian Liu, Lijun Chen. Cultural blueprint: Uncovering how merchant guild culture shapes corporate innovation[J]. *Finance Research Letters*, 2025, 85(PA).
- [7] Yuchen Liu. The Penetration of Abstraction and Analogy in the Teaching of Organic Molecular Structure under the Hybrid Learning Model[J]. *Contemporary Education and Teaching Research*, 2025, 6(7).
- [8] Yifan Li. Building Core Competitiveness based on Corporate Culture: A Case Study of Tsutaya Bookstore[J]. *Frontiers in Economics and Management*, 2025, 6(7).
- [9] N. Manyasi Beatrice. BLENDED LEARNING; MODELS FOR TRANSFORMING INSTRUCTIONAL PRACTICE[J]. *International Journal on Integrating Technology in Education*, 2025, 14 (2).
- [10] Yong Peng, Xi Wang, Zhi Lv. Adopting blended learning for teaching sport-related cultural heritage: leveraging the 'internet plus' model[J]. *Education and Information Technologies*, 2025, (prepublish).
- [11] Xornam Apedoe, Megan Fu, Katherine Nielsen, Rebecca Smith, Jessica Allen. Co-Learning: A Hybrid Model for Integrated STEM Teacher Professional Learning and Student Out-of-School Learning[J]. *Education Sciences*, 2025, (6).
- [12] Meriam Amamou. The effect of an innovation-driven corporate culture on firm success: a new survey of Saudi digital firms[J]. *Future Business Journal*, 2025, 11(1).
- [13] Warin Loasakul, Barbara Igel, Yuosre Badir. Developing innovation culture in traditional Asian corporations – the case of four large business organisations in Thailand[J]. *Asian Journal of Technology Innovation*, 2025, 33(2).
- [14] David Amankona, Kaigang Yi, Evelyn Agba Tackie, Lois Tweneboa Kodua, Leslie Afotey Odai. Responsible Digital Innovation and Innovation Performance in Ghana's High-Tech Industry: The Mediating Roles of Digital Organizational Culture and Strategy, and the Moderating Role of Digital Literacy[J]. *SAGE Open*, 2025, 15(2).
- [15] Grant Alexander Wilson, Jason Jogia, Eric W. Liguori. The mediating roles of financialization and vertical integration in the innovation culture and performance relationship: An examination of SME investment firms[J]. *Journal of Small Business Management*, 2025, 63(3).