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Blended Teaching in Middle School Classrooms: Problems and Strategies Research

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Abstract: *The rise of intelligent education brings new opportunities for the development of blended teaching, expanding its concept within a broader educational ecosystem. Through surveys, the current status of blended teaching in middle schools is investigated, revealing issues such as misconceptions about the approach, insufficient integration of online and offline elements, rigid application of resources, a lack of teacher-student interaction, and inadequate technical support, leading to suboptimal teaching outcomes. To address these challenges, the blended teaching process must be continuously optimized based on the BOPPPS model. Additionally, teaching elements should be refined through digital interaction to improve the effectiveness of blended teaching in classrooms.*

Keywords: *blended teaching; teaching model; online-offline teaching; middle school classrooms*

1. Introduction

The advent of the internet has driven the deep development of informatization and globalization, making online teaching and distance education emerging trends for the future of education. Over the past two decades, the Chinese government has issued several policy documents to promote the development of online education. The Outline of the National Medium- and Long-term Education Reform and Development Plan (2010-2020) proposed to "strengthen the construction of educational informatization and promote the process of educational modernization" [1]. The Ten-Year Development Plan for Educational Informatization (2010-2020) clarified the development goals and key directions. The Action Plan for Enhancing Quality and Expanding Access in Basic Education (Jiao Ji [2023] No. 4), issued in 2023, also highlighted the importance of online education. The emergence of the pandemic has accelerated the transition from "dual-line education" to the "dual-line blended teaching" model, making blended teaching research across various disciplines a growing focus [3].

The development of educational technology has diversified learning resources, methods, and venues, while emphasizing students' autonomy and individualized needs. Blended learning combines face-to-face instruction with online education, leveraging the guiding role of teachers while respecting students' agency to stimulate their learning motivation. The integration of e-learning with traditional learning not only transforms the way knowledge is presented but also optimizes teaching methods and formats by relying on specific contexts. As one scholar observed, "The application of new media heralds the advent of a new era," [2] making it an important task for educational research to explore the alignment of blended teaching models with various disciplines.

2. Definition of Blended Teaching

Blended teaching is an instructional model that integrates online and offline approaches, closely linked to the student learning process. Drawing on Professor Graham's three classifications and Professor Feng Xiaoying's three-stage theory [5], this paper defines blended teaching as a "learning experience" that combines online interaction between teachers and students with face-to-face guidance. By integrating internet technologies, mobile devices, and traditional teaching methods, blended teaching provides students with a personalized, highly interactive learning environment, enhancing student engagement, optimizing teaching processes, and promoting educational quality.

As a new learning paradigm, blended teaching retains the characteristics of traditional instruction while embodying "dual-line" features. Through the internet, students break free from the constraints of classrooms, with online and offline components forming the basis for teaching boundaries and coupling [11]. Thanks to the openness of the internet, teaching resources become more shareable, diverse, and

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interdisciplinary, offering teachers greater possibilities for lesson preparation and enabling personalized learning for students [2]. Online resources, primarily in virtual electronic formats, cater to learners' diverse needs, positioning teachers as supporters of personalized development.

In methodology, blended teaching leverages network technologies to revolutionize instructional thinking, breaking away from the traditional "three-center" model while emphasizing the stimulation of interest and innovative thinking. Compared with traditional face-to-face instruction, it liberates students' learning freedom, and in contrast to purely online teaching, it highlights interaction and feedback, fostering student-driven inquiry[4].

The evaluation of blended teaching exhibits diverse characteristics, including variety in data sources, methods, and participants [8]. Evaluation combines paper-based tests with online big data, balancing summative and formative assessments. Rich evaluation formats, such as micro-lessons and online assessments, diminish the dominance of teachers while encouraging participation from students, families, and communities.

3. Research Design

3.1 Research Questions

This study focuses on the middle school level, examining the current state of blended teaching in classroom practices. It encompasses face-to-face classroom instruction by subject teachers and various online teaching activities conducted independently by teachers and students at any time before, during, or after class. Through surveys and interviews, the study aims to identify the problems and causes of blended teaching in middle school curriculum practices.

3.2 Subjects and Tools

The investigation primarily employs questionnaires and interviews. The questionnaire survey and interviews target frontline middle school teachers and students. Electronic questionnaires were distributed online via QQ groups and WeChat groups. The questionnaire includes 14 items, covering basic information about students' classes and specific details about the implementation of blended teaching. Consistency testing showed a Cronbach's Alpha value of 0.687, indicating acceptable reliability. A total of 315 valid questionnaires were collected, and interviews were conducted with some teachers through phone calls and Tencent Meetings.

3.3 Data Collection and Analysis

The data collected were statistically analyzed using SPSS software.

3.3.1 Basic Information about Students

Students who participated in the survey came from various regions of China, including Sichuan, Shaanxi, Anhui, Fujian, Zhejiang, Guangdong, and Hunan. Class sizes ranged from 20 to 100 students. The questionnaire provided a general understanding of the current implementation of blended teaching in schools.

3.3.2 Teachers' Understanding and Expectations of Blended Teaching

Among the 10 frontline teachers interviewed, most reported a partial or basic understanding of blended teaching, while only about 20% stated they had little understanding. However, in-depth interviews revealed that most teachers' understanding of blended learning was narrow, often dichotomizing it into "in-class and after-class" or "online and offline." Referring to the theories of Professor Feng Xiaoying and Professor Graham, blended teaching was explained as a learning method combining online interaction and face-to-face guidance [9]. According to the student questionnaire, about 86.67% of students indicated that teachers require them to engage in online learning during regular teaching (see Figure 1). This aligns with interview findings, suggesting that blended teaching is being actively promoted in frontline teaching, with teachers' understanding and expectations gradually aligning with global educational trends.

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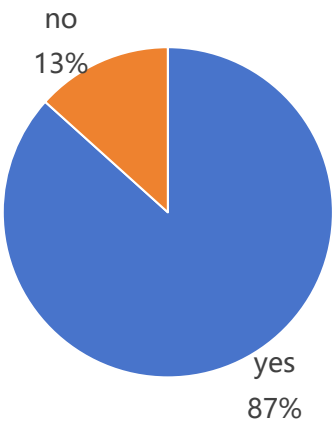

Figure 1: Do teachers require students to complete online learning in regular teaching.

3.3.3 Implementation of Blended Teaching

(1)Proportion of Time Spent on Blended Teaching

In classrooms practicing blended teaching, the proportion of time spent on online teaching is mostly concentrated within the ranges of less than 10% or 10% to 30%[7], indicating a relatively low proportion of total teaching time (see Figure 2).

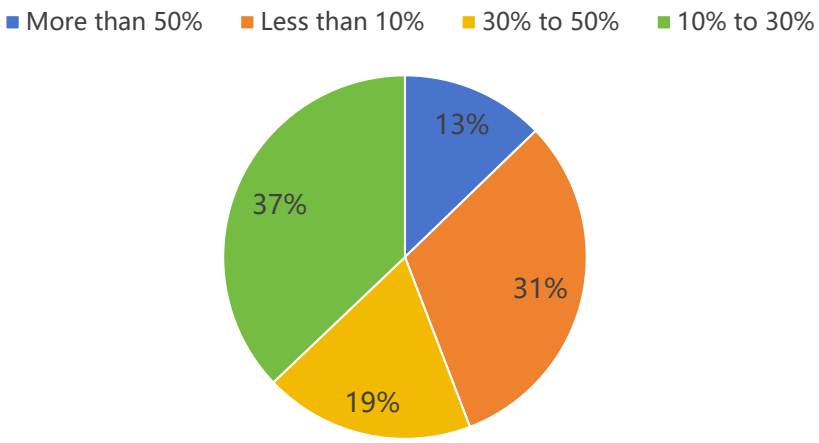

Figure 2: The proportion of total class time during which teachers use online teaching.

(2)Online Education Platforms

Regarding online teaching platforms, QQ, WeChat, Smart Education Platforms for Primary and Secondary Schools, and Rain Classroom are the mainstream choices, while platforms like EduSoho, Moodle, and Blackboard are less frequently used (see Figure 3). Teachers widely recognize the efficiency brought by abundant online resources, with over half strongly agreeing with their effectiveness in teaching preparation. However, despite the availability of diverse platforms and vast online resources, the conversion rate of resources remains relatively low in practice. Students' understanding of teaching content is still centered on traditional textbooks, with online teaching failing to fully exert its expanding and innovative functions. From teachers' perspectives, online activities primarily include the introduction of audio and video materials, resource expansion, and online assignments or tests, while few teachers create their own micro-lessons or encourage online self-study.

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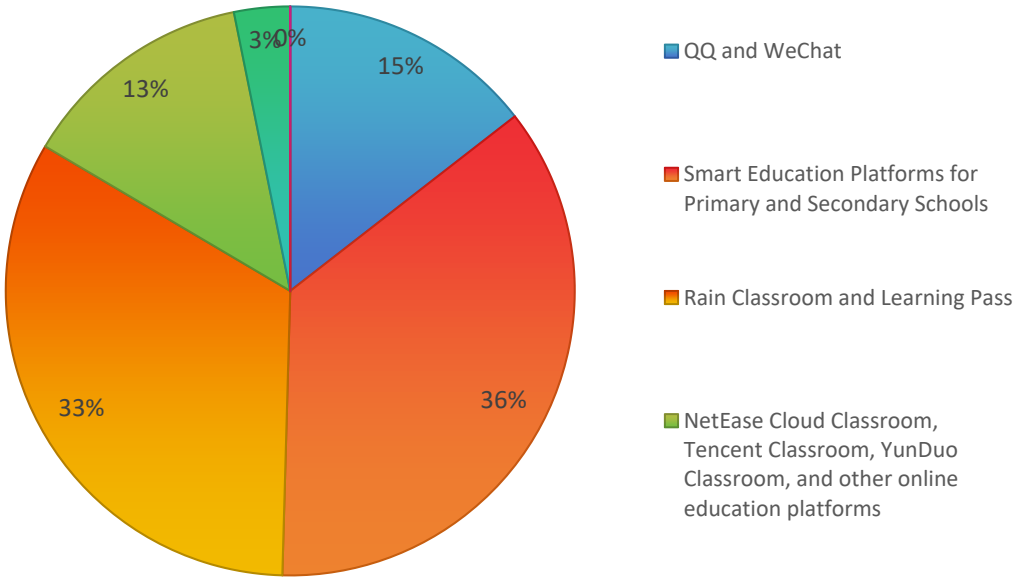

Figure 3: Online education platforms used by teachers in teaching practice.

(3)Online Teaching Interaction

Many teachers reported during interviews that it is challenging to obtain timely feedback from students in blended teaching, making it difficult to adjust teaching content based on students' conditions. Online learning interactions are minimal (see Figure 4), with teachers still relying on tests and assignments to understand students' learning situations. Students rarely provide feedback or raise questions independently (see Figure 5).

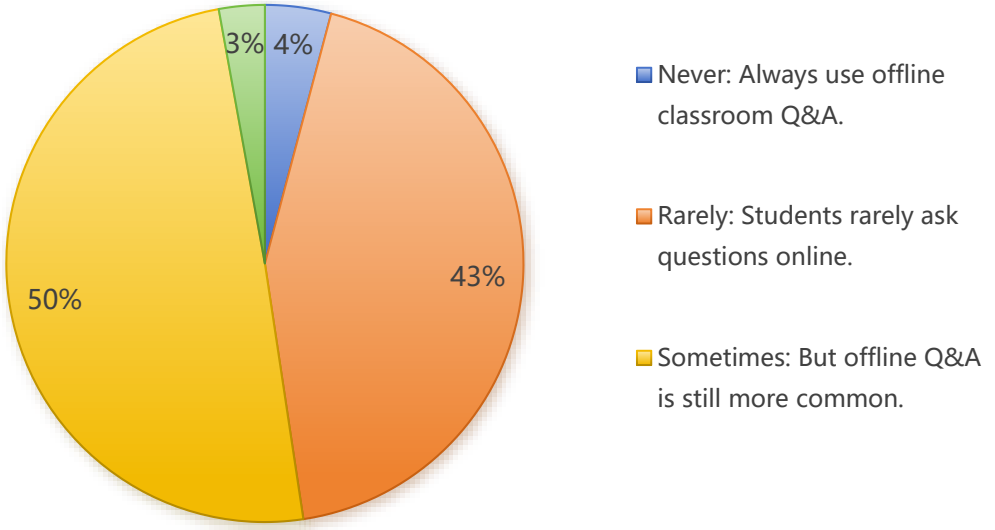

Figure 4: Do teachers conduct online Q&A sessions during the teaching process.

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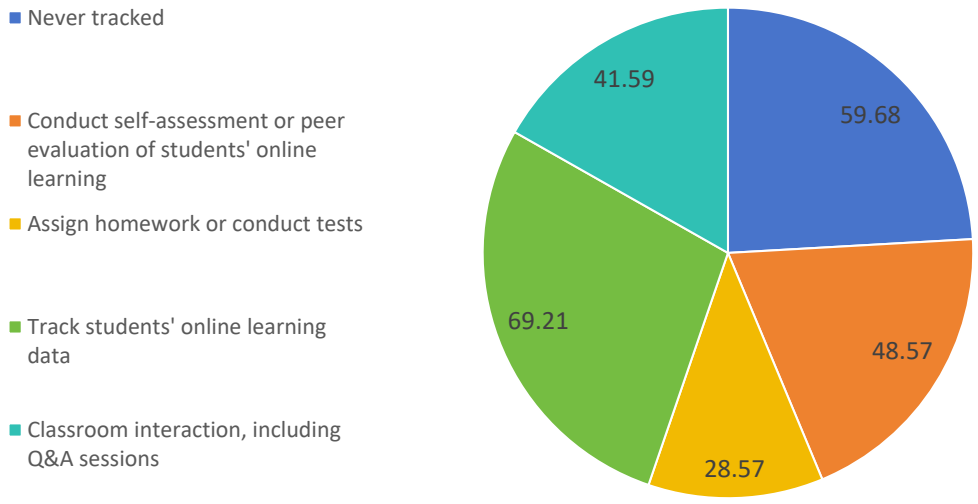

Figure 5: Methods teachers use to track students' online learning.

(4)Correlation Between Classroom and Online Teaching

Apart from teacher-student interaction, the questionnaire also surveyed the relevance of teachers' classroom instruction to students' online learning. Most students reported a low correlation between classroom teaching and their online learning, with over half choosing "completely unrelated" or "basically unrelated" (see Figure 6).

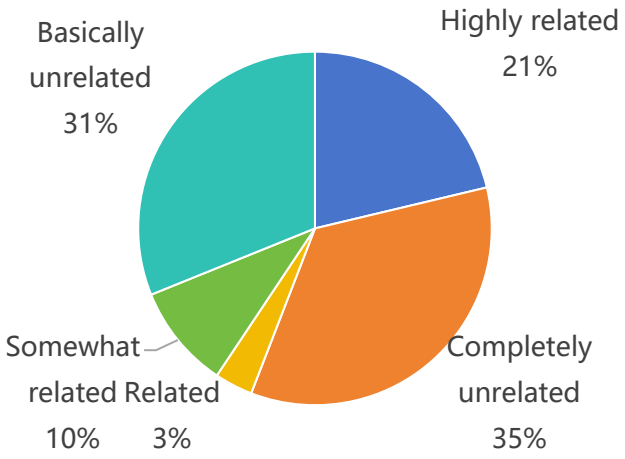

Figure 6: Based on your experience, how closely is classroom teaching aligned with students' online learning.

Approximately 80% of interviewed teachers admitted they do not adjust classroom content based on students' online learning outcomes, believing that online learning has limited impact on students' academic performance. Teachers primarily utilize online platforms for three purposes: checking learning outcomes, previewing or reviewing classroom knowledge, and supplementing classroom teaching content.

Referring to Professor Graham's classification of blended learning, the current blended teaching practices in middle school classrooms fall under the "facilitative blend," which seldom considers coordination and integration between online learning and classroom instruction. Strengthening students' agency and fully leveraging their initiative and creativity remain the future directions for the development of blended teaching.

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3.4 Evaluation of Blended Teaching by Teachers and Students

Students rated the current state of blended teaching at an average satisfaction score of 2.45 out of 5. However, both interviewed teachers and surveyed students expressed optimism about the future of online teaching and its potential to improve learning outcomes. They strongly agreed that well-executed blended teaching could create highly personalized learning experiences and enhance learning efficiency. Teachers emphasized that better integration of online and offline components would allow more time and methods for effective interaction with students, ultimately improving the outcomes of blended teaching. Meanwhile, the selection of online learning resources remains a challenge for both teachers and students. Designing more scientifically feasible online learning tasks, mastering the latest educational technologies, and ensuring the implementation of online learning are key difficulties to overcome.

4. Key Issues in Blended Teaching in Middle School Classrooms

4.1 Insufficient Integration of Online and Offline Teaching

The ideal state of online and offline teaching is mutual integration and reinforcement, forming a cohesive teaching process. A proper understanding of their relationship helps construct an optimal teaching model. However, in current practice, the relationship between online and offline teaching is challenging to manage. The internet, as a new teaching medium, often lacks coherence with teaching content and objectives, making it difficult to achieve higher-order learning.

The survey shows that many teachers use the internet merely as a supplement to teaching, positioning online teaching as a "prologue" or "footnote" to classroom instruction. Tasks such as previewing, reviewing, and knowledge expansion are assigned to students online, but traditional teacher-led and student-receiving classroom teaching models remain largely unchanged. According to the questionnaire data and interview results, only about 20% of teachers actively explore advanced online teaching forms, often in the form of flipped classrooms where students complete tasks independently.

As one teacher noted, "Before implementing blended teaching, most teachers lack a true understanding of integrating the internet with education. In practice, many teachers don't know how to integrate effectively, simply placing internet resources and teaching content together mechanically, without substantial breakthroughs in online teaching" (I-T1-2024-03-15).

The inability to achieve organic integration stems from the failure of the blended teaching model to deconstruct traditional indoctrination-based teaching effectively and to reconstruct a dynamic learning environment centered on interaction and sharing[12]. Specifically, the introduction of online teaching has not deeply integrated with offline teaching in terms of educational models and learning structures. This lack of integration often results in blended teaching becoming superficial in practice, failing to drive educational innovation or promote changes in student learning methods.

4.2 Rigid Application of Resources

Blended teaching should be founded on two-way interaction between teaching and knowledge. However, current online learning systems mainly replicate traditional teaching formats, leveraging internet connectivity to pile up resources without enabling effective knowledge exchange between teaching mediums and participants. Online learning, represented by the internet, is often limited to data transmission and resource organization, rarely integrated with offline teaching practices.

If online teaching were seamlessly woven into offline teaching, it could deepen students' understanding, enhance cognitive processing efficiency, and optimize learning outcomes. Yet, teachers' perceptions of educational resources remain narrow. Survey results indicate that online teaching occupies only 10%-30% of total class time on average. As one teacher explained, "Teachers want to increase online teaching time appropriately, but this would add pressure to the teaching schedule. The available resources, mostly audiovisual or text-based, hold limited significance for integration throughout the class. They are better suited for students to review after class, with the main teaching design completed more effectively in class" (I-T3-2024-03-15).

The disconnect between online learning resources and face-to-face teaching impacts teaching efficacy. The reasons lie in three main dimensions: teacher competency, student habits, and the teaching

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environment. The richness of resources collected by teachers and their understanding of these resources greatly influence teaching design. Additionally, students' self-management and cooperative learning abilities play a decisive role. Students accustomed to traditional face-to-face learning may find it difficult to adapt to a "self-service" learning model. Moreover, the shift of the learning environment from classrooms to online spaces presents new challenges for the use and exchange of resources, further contributing to the stagnation in resource flow.

4.3 Lack of Bidirectional Interaction

Constructivism posits that teaching is a process of bidirectional interaction between teachers and students, actively constructed in specific contexts. Blended teaching, based on constructivist theory, should also embody bidirectional interaction in its dual-line model. Learning, by nature, is the process of building an ecological network, where the knowledge system should circulate. Students gather information from sources like the internet and textbooks, internalize it, connect it with existing knowledge, and feedback the newly formed knowledge network to the original resources.

"The greatest challenge in the online component of blended teaching lies in communication and interaction between teachers and students, a problem most evident during prolonged remote learning during the pandemic" (I-T5-2024-03-17). As another teacher noted, "Although online networks can ensure the continuation of teaching tasks" (I-T7-2024-03-25), "they fail to provide real-time guidance for learners, and student-to-student interaction significantly diminishes. This closed communication style severely affects teaching outcomes and experiences" (I-T2T4-2024-03-15, I-T10-2024-03-26).

Currently, nearly 60% of teachers rarely or never track students' online learning, and their selection and adjustment of teaching content show little correlation with students' online learning outcomes. The absence of interactive processes in blended teaching, with a clear divide between online and offline components, limits the role of online teaching to unidirectional transmission of materials such as videos, without feedback or Q&A interactions.

The lack of interaction indicates poor alignment between teacher and student roles. On the teacher's end, inadequate professional competency and misunderstandings of their evolving role contribute to the problem. In the online teaching environment, teachers' roles acquire new digital attributes, demanding an expansion beyond their traditional humanistic focus. From the student perspective, the absence of adaptive, responsive, and feedback capabilities exacerbates the disconnect. The lack of innovative thinking and autonomous abilities among students further hinders successful integration in blended teaching.

4.4 Misconceptions in Understanding

The integration of education and technology is an inevitable trend. "Reforming teaching models is crucial for educational development. Many teachers are willing to implement blended teaching" (I-T8-2024-03-25). However, "At present, the problem is that other stakeholders in education remain passive" (I-T5-2024-03-17). Parents, society, and students often lack a proper understanding of blended teaching. Meanwhile, "Teachers face significant pressure to achieve high enrollment rates, lacking the necessary support to promote blended teaching widely" (I-T6-2024-03-25).

The formation and transformation of educational philosophies result from multifaceted realities. Traditional teaching perspectives, long embedded in current practices, overly emphasize knowledge transmission while neglecting its developmental diversity. Additionally, education policies and assessment systems—often seen as "guiding principles"—provide insufficient support for online teaching. The entrenched status of traditional written exams as key evaluation metrics leaves little room for teachers to explore blended teaching's integration with various disciplines.

On the teacher's end, the inertia of years of teaching experience and the need for innovation pose significant challenges during comprehensive reforms. On the learner's end, students accustomed to traditional offline learning may resist new teaching models. Promoting blended teaching requires a shift in mindset across all stakeholders—students, teachers, parents, and communities—toward modernization in teaching and learning attitudes.

4.5 Insufficient Technical Support

Blended teaching is inherently a "dual-line fusion," where online network teaching and offline

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face-to-face teaching are equally important[16]. As an extension of face-to-face teaching, online network teaching has become a focus in constructing blended teaching but also presents significant challenges in primary and secondary education. Despite advances in network technology, including platform modules, resource updates, and interactive experiences, current capabilities still fall short of teaching needs.

The limitations stem partly from the technological constraints of online platforms and partly from technical challenges faced by teachers and learners. As one teacher noted, "Although schools advocate using modern information technology, such as Smart Education Platforms for Primary and Secondary Schools or Rain Classroom, many teachers have limited skills in internet-based teaching, using only basic platform functions without deeply linking online formats with teaching content" (I-T5-2024-03-17). Another issue is the lack of professional technical staff for platform management and maintenance (I-T1-2024-03-15). This inadequacy in organizational support restricts teaching flexibility.

In the absence of sufficient technical capacity, most teachers adopt conservative teaching approaches, often merely transferring classroom materials, such as PowerPoint slides, to online platforms without substantial changes. This practice undermines the potential of blended teaching, reducing it to a superficial adaptation rather than a transformative model.

5. Optimization Strategies for Blended Teaching in Middle School Classrooms

5.1 Reforming the Teaching Process Based on the BOPPPS Model

The insufficient integration of online and offline components in blended teaching results in rigid resource utilization. To enhance teaching quality, the BOPPPS model, grounded in constructivist and connectivist theories, is recommended [10]. This model employs a closed-loop design through Bridge-in (B), Objective (O), Pre-assessment (P), Participatory Learning (P), Post-assessment (P), and Summary (S) stages, enhancing students' self-directed learning abilities and fostering teachers' innovative thinking [8].

5.1.1 Pre-Class Preparation: Online Learning and Initial Understanding

This phase uses online learning to help students gain a preliminary understanding of the content, laying the foundation for subsequent stages. Teachers should encourage students to form groups through communication platforms, adhering to principles of multi-level interaction and diversity to foster peer collaboration and teamwork skills. Teachers can use online platforms to release learning objectives and tasks in advance, adjusting the traditional classroom structure to design self-directed learning tasks centered on core knowledge and applications, guiding students toward in-depth learning.

Teachers need to integrate teaching content, create instructional videos or case studies, and share them with student discussion groups. This helps students quickly engage with the learning context and complete preparatory tasks. This stage emphasizes moving beyond simple information exchange to establishing a smart classroom environment, incorporating individual, collaborative, and collective intelligence learning. Additionally, teachers should gather student feedback, analyze their levels and needs, identify key points and challenges, and enhance classroom efficiency.

Students are expected to actively study the learning materials provided by teachers and use online resources to explore supplementary materials and expand their understanding. Through online multimedia engagement and practical discussions, students should achieve deep interaction between "learning" and "practicing" based on their knowledge comprehension, preparing thoroughly for classroom learning.

5.1.2 In-Class Interaction: Deepening Understanding and Internalizing Knowledge

The in-class phase includes pre-assessment and participatory learning, supplemented by post-assessment and summarization. This is the core stage of the teaching model. During this phase, teacher-student and peer interactions focus on discussing key and challenging points of the lesson and addressing pre-class questions[6]. This helps students deeply understand core content, internalize knowledge, and connect pre-class and post-class learning.

Teachers use the attendance feature of online platforms to check student participation and conduct pre-assessments to quickly evaluate students' preparation. This allows them to identify key points and challenges, optimizing the use of class time. During participatory learning, teachers explain challenging

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content, engage in deep interaction, and facilitate collaborative learning, establishing a "me-you" relationship between teachers and students [13] to achieve effective teaching. Guided by the principles of flipped teaching, problem-based, and topic-based instructional methods [14], the approach transitions from linear teaching to a smart learning ecosystem, fostering creativity development.

At the end of the session, teachers conduct post-assessments and summarizations to help students organize their knowledge structure and deepen their understanding. This closed-loop design of interaction and feedback enhances the quality of classroom teaching and cultivates students' smart learning abilities.

5.1.3 Post-Class Consolidation: Knowledge Expansion and Evaluation Enhancement

The post-class phase primarily involves conducting post-assessments and summarizing the lesson. Building upon the successful completion of the previous two phases, this stage leverages online teaching platforms for teacher-student and peer interactions to provide feedback, summarize key points, and consolidate and expand core knowledge. It also serves as an essential phase for reinforcing knowledge and laying the foundation for future learning, adding the finishing touch to the overall learning process.

Traditional middle school classroom summaries often conclude with workbook exercises or test papers, which are rigid and lack imagination and flexibility. In the context of the new curriculum reform, post-class activities and summaries should focus on enhancing students' practical skills and cultivating critical thinking. Online platforms provide opportunities for students to engage in social participation, creation, and expression, as well as to organize learning content, showcase outcomes, and reflect on their learning.

Regarding post-class evaluations, the rise of educational informatization and digitalization offers strong support for implementing flipped classroom principles and establishing developmental and precise evaluation systems. At the end of each lesson, chapter, unit, or semester, teachers can use data platforms to generate personalized electronic learning profiles for students. These profiles allow for the evaluation of students' current learning levels, using structured and criterion-based rubrics. This approach moves beyond the limitations of traditional, subjective evaluations and enables targeted teaching interventions to address specific issues effectively.

5.2 Optimizing Teaching Elements through Digital Interaction

Issues such as interaction gaps, conceptual misunderstandings, and technological inadequacies in blended teaching stem from the low level of digitalization of teaching elements. Enhancing the digital interaction level of these elements can help improve teaching quality.

5.2.1 Conduct Teacher Training to Enhance Digital Literacy

Teachers need to shift roles to become planners and innovators of digital teaching. Professional training should help teachers become proficient with online teaching tools and master both basic operations and advanced technology applications. Training programs should integrate the latest advancements in educational technology, emphasize hands-on practice, develop personalized learning pathways, establish peer-support networks, and implement feedback mechanisms. Teachers should be encouraged to integrate information technology into their instructional design to enhance teaching effectiveness.

5.2.2 Improve Resource-sharing Platforms to Build Efficient Databases

Shared teaching resources are key to optimizing instructional design. Through multi-stakeholder collaboration, rich and personalized resource databases can be developed, incorporating text, video, simulations, and other formats. Teachers, after receiving training, can create unique resources, fostering a positive feedback loop between the resource database and teaching practices, thereby improving resource utilization and making teaching more engaging.

5.2.3 Create Intelligent Teaching Environments

Schools should enhance campus networks to ensure comprehensive coverage and efficient transmission, meeting the demands of online learning. Schools should also develop integrated smart classrooms and cloud-based learning platforms to provide flexible teaching spaces for teachers and students, improving teaching efficiency both in the classroom and at home [15].

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5.2.4 Emphasize Student Feedback to Boost Learning Motivation

Teachers should collect student needs through surveys, interviews, and other methods, and educational institutions should establish dynamic evaluation systems to help students adjust their learning strategies. Educators should leverage data platforms and gamified elements to design personalized learning paths, increasing student interest and confidence. Teachers should strengthen students' self-regulation skills through training in learning strategies and time management, fostering independent learners and enabling self-driven learning.

6. Conclusion

Blended teaching offers a transformative approach to education by integrating online and offline elements to create a cohesive and innovative learning experience. However, challenges such as interaction gaps, conceptual misunderstandings, and technological limitations must be addressed to realize its full potential. Through the adoption of structured models like BOPPPS, the enhancement of digital literacy among teachers, the improvement of resource-sharing platforms, and the creation of intelligent teaching environments, it is possible to significantly elevate teaching quality. Furthermore, emphasizing student feedback and fostering self-regulation skills can enhance learning motivation and outcomes. By addressing these issues with targeted strategies, blended teaching can evolve into a more effective, inclusive, and dynamic educational model, equipping students and teachers for the demands of modern education.

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