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Exploration and Practice of Blended Online and Offline Teaching Mode for Advanced Mathematics

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ABSTRACT
In the context of educational digital transformation, as a fundamental course in colleges and universities, Advanced Mathematics is in urgent need of innovating its teaching modes. The blended online and offline teaching model, as an emerging teaching form, is gradually gaining widespread attention. This paper focuses on analyzing the advantages of the blended online and offline teaching model for Advanced Mathematics. On this basis, it proposes practical strategies, in order to promote students' in-depth understanding and mastery of Advanced Mathematics knowledge and improve the teaching quality of this course through diverse teaching methods.

KEYWORDS
Advanced mathematics; Online and offline; Blended teaching mode

1 Introduction

The blended online and offline teaching mode is a combination of various teaching activities. It provides students with flexible and varied learning paths, and helps to stimulate their initiative and interest in study. Therefore, in-depth research on the exploration and practice of the blended online and offline teaching mode for Advanced Mathematics can inject new vitality into this traditional foundational course.

2 Advantages of the Blended Online and Offline Teaching Mode for Advanced Mathematics

2.1 Accumulate Abundant Teaching Resources

Compared with traditional Advanced Mathematics teaching, the blended online and offline teaching mode can leverage modern information technology to widely collect and integrate various high-quality teaching resources. Online, a wide variety of teaching videos, courseware, and case resources can be obtained from numerous well-known educational platforms or academic websites such as MOOC and Zhihuishu. After careful selection and organization, these resources demonstrate remarkable advantages in terms of quantity, quality, standardization, and orderliness. They can provide a robust foundation for teachers ' teaching and enhance the competitiveness of teaching resources for Advanced Mathematics in colleges and universities [1]. Offline, based on their own teaching experience and students ' actual needs, teachers reprocess and optimize the online resources, and can independently develop some targeted teaching materials, such as featured lecture notes and customized exercise sets. The organic combination of online and offline resources frees Advanced Mathematics teachers in colleges and universities from teaching the content of a single textbook, and provides sufficient resource support for Advanced Mathematics teaching.

2.2 Break through the Space-time Limitations in Teaching

Traditional Advanced Mathematics teaching is constrained by class-based teaching, and mainly relies on blackboard writing and other teaching methods to guide students to conduct logical reasoning on mathematical problems. Moreover, the limited time available in Advanced Mathematics classes is not conducive to the divergence of students ' mathematical thinking and the cultivation of their autonomous mathematical learning abilities. However, the blended online and offline teaching mode for Advanced Mathematics is different. It breaks through the space-time limitations in teaching. In terms of time, it is not bound by the unified schedule of Advanced Mathematics teaching set by colleges and universities, thus allowing students to have more flexible time for online learning and enabling them to study independently in accordance with the tasks assigned by teachers. At the same time, teachers have more flexible time for online tutoring, and they can provide immediate answers to students ' questions without being strictly restricted by the time frame of traditional classroom teaching. In addition, students can repeatedly watch teaching videos via online platforms to deepen their understanding of difficult knowledge in Advanced Mathematics. Such flexibility and repeatability greatly improve the effectiveness of students ' learning of Advanced Mathematics.

2.3 Establish a Comprehensive Teaching Environment

The implementation of the blended online and offline teaching mode for Advanced Mathematics can create a

comprehensive and three-dimensional modern teaching environment centered on college students, which can provide them with a favorable learning atmosphere and enable them to achieve a better learning experience. Online, teachers can utilize rich multimedia teaching resources to conduct exploratory and interactive classroom activities to stimulate students' interest in learning Advanced Mathematics. Offline, by contrast, teachers can adopt face-to-face lectures, group discussions and other methods to deepen students' understanding of knowledge points, and foster their ability to solve practical problems. Additionally, teachers can guide students to conduct autonomous extended learning by leveraging other teaching platforms or databases in offline sessions. This blended online ad offline teaching method creates a comprehensive and efficient teaching environment for students [2].

3 Practical Strategies of the Blended Online and Offline Teaching Mode for Advanced Mathematics

3.1 Comprehensive Preliminary Preparation

Comprehensive preliminary preparation is the prerequisite and foundation for the implementation of the blended online and offline teaching mode for Advanced Mathematics.

Firstly, teachers should collect and analyze students' learning situations comprehensively. Teachers can issue questionnaires to students through online teaching platforms to collect their learning habits in Advanced Mathematics and their mastery of various learning modules of this course. Meanwhile, teachers need to conduct a comprehensive analysis of multi-dimensional data including students' admission scores, in-class interaction feedback, or periodic test results, in order to accurately grasp students learning situations in Advanced Mathematics, provide a solid basis for formulating teaching plans for the blended online and offline teaching mode, and ensure the practicality and scientificity of such plans. Besides, teachers need to keep a timely track of students' current motivation and psychological state in Advanced Mathematics learning, so as to gain an in-depth understanding of difficulties and challenges students encounter in the learning process. Thereby, teachers can incorporate targeted psychological counseling or incentive strategies into the design of subsequent teaching plans to further enhance students' enthusiasm and participation in Advanced Mathematics learning.

Secondly, teachers should reasonably allocate the teaching content for online and offline sessions. To effectively avoid the duplication and waste of Advanced Mathematics teaching resources between online and offline channels, teachers need to determine the respective tasks and objectives for online and offline instruction based on the analysis of students' learning status and the complexity of knowledge in Advanced Mathematics courses. For online teaching, the focus should be placed on the explanation of basic knowledge, and the guidance for students in preview and review sessions. By contrast, for offline teaching, more emphasis should be laid on the in-depth understanding of key and difficult knowledge in Advanced Mathematics, the resolution of difficult problems, the practical application of specific knowledge, and the infiltration of mathematical thinking, in order to improve the effectiveness of Advanced Mathematics learning. Moreover, it is also imperative to pay attention to the coherence in the content allocation between the two sessions, ensuring that the online and offline teaching content can be seamlessly connected to form a complete and coherent teaching system for Advanced Mathematics.

Thirdly, teachers should integrate and optimize the teaching resources for Advanced Mathematics. Teachers need to comprehensively sort out the existing teaching resources for Advanced Mathematics, which mainly cover three categories: basic learning resources such as mind maps and microlecture videos on fundamental theories; extended learning resources including microlecture videos on mathematical application cases and online test question banks; and independent learning resources at the elementary, intermediate, and advanced levels. Through systematic integration of these resources, a well-structured and diversified teaching resource repository can be constructed to provide a material foundation for the blended online and offline teaching. Additionally, teachers should optimize teaching resources in a targeted manner based on the characteristics of the blended online and offline teaching mode, enabling there resources suitable for the convenience of online teaching and the interactivity of offline teaching, thereby forming a complementary and mutually supportive teaching resource system [3].

3.2 Three-stage Interactive Teaching

The three-stage interactive teaching constitutes an important component of the practice of the blended online and offline teaching mode for Advanced Mathematics, which mainly consists of three closely interlinked stages: pre-class, in-class, and post-class.

Pre-class: Online preparation. Before class, teachers are required to use the "knowledge preposition" method and rely on the online teaching platform to assign Advanced Mathematics preview tasks, and guide students to conduct independent learning by utilizing the abundant online teaching resources, such as watching microlecture videos on basic theories or completing pre-calss self-assessment questions. These approaches can not only help students identify the key and difficult points of learning content and construct a preliminary knowledge system, but also lay a solid foundation for subsequent in-class learning for Advanced Mathematics [4]. At the same time, teachers can collect students' preview

feedback through online platforms to identify the difficulties they encounter during the preview process, and then adjust teaching strategies to provide targeted guidance for in-class teaching.

In-class: Offline teaching. In the offline teaching of Advanced Mathematics courses, teachers need to fully leverage the interactive advantages of offline teaching. Based on students' pre-learning feedback, teachers should conduct focused explanations and in-depth analyses of the common problems in the feedback, and provide one-on-one answers to individual students' questions. On this basis, they should strive to adopt various teaching methods such as blackboard derivation and multimedia presentation to visualize and materialize abstract Advanced Mathematics knowledge. In doing so, they can help students overcome difficulties and achieve the effective transmission and internalization of Advanced Mathematics knowledge. At the same time, through face-to-face interactive and communication in off-line sessions, teachers can guide students to reflect on the knowledge learned in Advanced Mathematics classes by means of encouraging student presentations, integrating teaching and practice, and analyzing cases. During this process, teachers should provide mobile mentoring and promote students' in-depth understanding of Advanced Mathematics knowledge through the collision of ideas, thereby improving the attainment rate of the Advanced Mathematics teaching goals.

Post-class: Online review and extension. Teachers can release relevant learning tasks and assign targeted after-class homework through online teaching platforms, such as comprehensive exercises with a certain degree of difficulty, and small mathematical modeling projects, to facilitate students' consolidation and application of the knowledge learned in class. Meanwhile, teacher can provide supplementary learning materials for students, such as cutting-edge research papers in the field of Advanced Mathematics related to the current classroom teaching, so as to broaden students' academic horizons and support them in effectively reviewing the course content and conducting in-depth learning. Moreover, teachers can carry out online Q&A and discussion activities using online platforms to promptly answer questions students encounter during the post-class review and expansion, and understand students' mastery of Advanced Mathematics knowledge. The above methods can help students achieve the transfer of mathematical knowledge through the formation and consolidation of procedural and metacognitive knowledge, and provide reference for teachers' subsequent teaching, thus achieving a positive interaction between online and offline teaching.

Taking the teaching of the knowledge point "Concept and Application of Derivatives" as an example, the three-stage interactive teaching model is applied to design practical cases that are in line with the profession, in order to achieve an organic combination of theory and practice. In the pre-class online preparation stage, centering closely on the core goal of "guiding independent preview and collecting feedback and confusion", teachers push a basic case of "the rate of change in view counts in the first 5 minutes of short videos" and pre-set thinking questions to guide students to sort out the basic concepts of derivatives by combining major-related questions, and accurately identify their difficult points in understanding the "rate of change". In the in-class offline teaching stage, teachers implement the core requirement of "focusing on common difficulties and strengthening interaction deepening", and explain the core knowledge of derivatives in combination with pre-class feedback. Meanwhile, they guide students to apply the learned knowledge to calculate the instantaneous growth rate of view counts and determine the peak period of popularity, and correlate such learning with the professional needs of video promotion, thereby achieving an in-depth integration of knowledge materialization and professional application. In the post-class online review and expansion stage, teachers practice the closed-loop goal of "hierarchical consolidation and interactive optimization", and assign the supporting exercise themed "derivative calculation + analysis of short video view count" and the extend task of "analyzing the fluctuation law of live streaming traffic". It not only consolidates the knowledge learned in class, but also promotes knowledge transfer, effectively solving problems such as weak mathematical foundation and disconnection between knowledge and application among students majoring in media studies.

3.3 Multidimensional Evaluation Construction

The construction of multi-dimensional evaluation system is an important part of the practice of the blended online and offline teaching mode for Advanced Mathematics.

Firstly, at the university level. Universities can establish a dedicated evaluation team to regularly assess the practical effectiveness of the blended online and offline teaching mode for Advanced Mathematics on campus. They should focus on conducting a comprehensive evaluation in terms of the achievement of teaching goals for blended online and offline teaching in Advanced Mathematics, the utilization rate of online and offline educational resources, and students' learning satisfaction, and compile a scientific and reasonable evaluation report. Then based on the evaluation results of the team, they can propose targeted improvement suggestions for the deficiencies in the operation of the blended online and offline teaching mode, and promptly feedback the evaluation results to teachers and students, thereby providing a strong evidence for the optimization of Advanced Mathematics teaching and the self-improvement of students. In addition, universities can organize intercollegiate exchanges and interactions to focus on sharing the practical experience and achievements of the blended online and offline teaching mode for Advanced Mathematics, thereby promoting mutual communication among universities.

Secondly, at the teacher level. On the one hand, a daily teaching evaluation mechanism for Advanced Mathematics among teachers should be established. It takes the competition assessments of teachers' blended online and offline Advanced Mathematics teaching or relevant teaching research achievements as benchmarks to conduct an objective evaluation of their teaching abilities and effectiveness in Advanced Mathematics, in order to motivate teachers to continuously improve their teaching proficiency. On the other hand, the actual weights of various evaluation indicators should be standardized and confirmed, with particular emphasis on highlighting the evaluation of teachers' teaching quality in blended online and offline Advance Mathematics courses, their educational effectiveness, and their achievements in teaching reforms in the weight allocation. Furthermore, it can avoid the problem of the dispersion of teachers' teaching energy caused by unclear evaluation indicators or unreasonable weight distribution. Meanwhile, it is necessary to build a dynamic evaluation adjustment mechanism to optimize the evaluation indicators and weights of teachers in a timely manner based on the aforementioned assessment results, so as to ensure the effectiveness of the evaluation system, and thereby provide scientific support for the practice of the blended online and offline teaching mode for Advanced Mathematics [5].

Thirdly, at the student level. The evaluation focuses on multiple dimensions such as students' participation and engagement in online learning, their acquisition of online teaching resources, their offline learning performance, and their completion of homework, so as to avoid the one-sided evaluation based solely on academic scores. A comprehensive consideration of these dimensions enables a more comprehensive and objective reflection of students' learning effectiveness in blended online and offline Advanced Mathematics courses. At the same time, based on the evaluation results, teachers can establish individual learning and growth portfolios for students to record their learning performance at different stages. On this basis, teachers can communicate with students one-on-one, and provide personalized learning guidance and suggestions, thereby effectively stimulating students' motivation and interest in learning Advanced Mathematics, helping them better adapt to the blended online and offline teaching mode for the course, and improving their learning outcomes. Additionally, students can also be encouraged to propose relevant suggestions for this mode based on their learning experience and gains in the blended online and offline teaching mode for Advanced Mathematics, thereby helping teachers further optimize their teaching strategies and achieve mutual improvement between teaching and learning. The practical research by Zhang Meng et al. (2020) indicates that an evaluation system including dimensions such as the degree of teacher-student interaction participation and the quality of problem feedback can more comprehensively reflect students' learning effectiveness. In this research, 83.57% of students express support for the blended teaching mode that incorporates two-way feedback, fully confirming the positive effect of this mode on enhancing students' learning interest and effectiveness [6].

4 Conclusion

The exploration and practice of the blended online and offline teaching mode for Advanced Mathematics holds profound significance for promoting the innovative development of Advanced Mathematics teaching. In the future, with the development of advanced science and technology and the continuous optimization of teaching modes, the blended online and offline teaching mode for Advanced Mathematics will embrace a broader development prospect.

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References

[1] LIU Zhiguo, LIU Zhifeng. Research on the Co-construction and Sharing Model and Strategy of Educational Resources in Higher Vocational Colleges [J]. Chinese Vocational and Technical Education, 2020, (29): 57-61.

[2] LIU Xianmin, HUI Shurong, LI Lifen, et al. Exploration and Practice of Online and Offline Blended Learning Mode in Advanced Mathematics [J]. Journal of Shenyang Agricultural University (Social Science Edition), 2021, 23(04): 491-497.

[3] HE Chuanmei, XIE Nan, JIANG Hao. Application of the "One Precedent, Three Cycles and Two Penetrations" Blended Teaching Mode in Advanced Mathematics Teaching [J]. Industrial & Science Tribune, 2025, 24(16): 200-203.

[4] XU Wei, WANG Congshuai, WANG Guantuan. How to Implement Hybrid Teaching in the Theoretical Courses of Physical Education——Illustrated by the Construction and Application of the "7P" Hybrid Teaching Model [J]. Journal of Physical Education, 2025, 32(02): 123-131.

[5] LANG Huanlin, CONG Chunxia. Improve the Evaluation System of Ideological and Political Teachers in Universities with Emphasis on Teaching Priority [J]. Leading Journal of Ideological & Theoretical Education, 2024, (12): 96-103.

[6] ZHANG Meng, YANG Yang, LIU Shunyi. Research on the Blended Teaching Model based on "Two-way Feedback" Principle——Taking the Public Elementary Course of University Mathematics as the Example [J]. Modern Educational Technology, 2020, 20(12): 119-125.