Reflections on Blended Teaching Reform of Higher Mathematics Courses in the Internet Era

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Abstract: With the rapid development of information technology and the increasingly wide application of the Internet in the field of education, the traditional teaching mode is facing a profound change. Blended teaching, as a new teaching mode integrating traditional classroom and online learning, has gradually become an important direction of educational reform. The purpose of this paper is to discuss the necessity and feasibility of blended teaching reform of higher mathematics courses in the Internet era, analyse the difficulties existing in the current teaching, and put forward the corresponding reform strategies, with a view to enhancing the teaching effect and cultivating the comprehensive quality of students.
***Keywords*:** internet age; higher mathematics courses; blended; teaching reforms

1. Introduction

In the context of today's era of rapid development of the Internet, in-depth thinking about blended teaching reform for higher mathematics courses is particularly crucial and necessary. Blended teaching, as the name suggests, is a teaching mode that combines the traditional face-to-face teaching method with the convenience and flexibility of modern network teaching. This mode not only integrates the advantages of the two teaching methods, but also, through the use of various technological means and innovative teaching methods, is committed to further improving the quality and effectiveness of teaching, enabling students to obtain a more comprehensive and in-depth understanding of knowledge in a richer and more diversified learning environment.

2. Definition of blended learning

Blended teaching, also widely known as blended learning, is an innovative educational model which skilfully blends the direct interactivity of traditional face-to-face teaching with the flexibility and convenience of modern online teaching. The aim of blended learning is to create a more flexible and personalised learning environment for students through the organic combination of well-designed online resources and productive offline activities, thus meeting the needs of different learners. The advantage of this approach is that it not only makes full use of the conveniences offered by Internet technology, such as anytime, anywhere access to learning resources and rich multimedia teaching materials, but also maintains the directness and immediacy of face-to-face interactions between teachers and students, which is crucial to students' understanding of complex concepts and mastery of skills.[1] The core concept of blended learning is the use of modern technological tools to enhance teaching and learning while ensuring interactivity and student engagement in the educational process, making the learning process more lively and effective, and thus improving student motivation and learning outcomes.

3. The Necessity of Blended Teaching Reform of Higher Mathematics Courses in the Internet Era

In the context of today's Internet era, it is especially necessary to carry out blended teaching reform for higher mathematics courses. With the rapid development of science and technology, the traditional teaching mode can no longer fully meet the learning needs of modern students. Students need more flexible and interactive learning methods to better adapt to the changes of the information age. Blended learning, which combines online and offline teaching resources and methods, can provide students with a richer and more personalised learning experience. This mode of teaching can not only improve students' learning efficiency, but also stimulate their interest in learning and cultivate their independent learning ability and critical thinking. Therefore, the reform of higher mathematics courses is imperative to meet the requirements of education in the new era.[2]

In addition, blended teaching reform can also help teachers to better carry out teaching management, through the online platform to collect students‘ learning data, timely understanding of students’ learning progress and difficulties, so as to carry out more targeted teaching guidance. At the same time, teachers can use online resources to enrich the classroom content,

make the classroom more lively and interesting, and improve students' learning enthusiasm. In addition, blended teaching can also promote communication and cooperation among students, through online discussion forums, group projects and other forms to enhance students' teamwork ability. In conclusion, the blended teaching reform of higher mathematics courses in the Internet era is not only of great significance for improving teaching quality, but also has an unignorable role in cultivating students' comprehensive quality and ability to adapt to the future society.

4. Difficulties in Teaching Higher Mathematics Courses in the Internet Era

4.1 understanding and application of abstract concepts

In the Internet era, the teaching of higher mathematics courses faces many challenges, one of the first difficulties being students' understanding and application of abstract concepts. As the concepts involved in higher mathematics are often highly abstract, it is difficult for students to grasp the essence of these concepts without actual physical models or concrete examples. The connotation and extension of these abstract concepts often require in-depth thinking and repeated practice before they can be gradually understood. In addition, applying these abstract concepts to practical problems requires students to have strong logical thinking skills and a sense of innovation, which puts higher demands on the teaching process. Teachers need to design creative teaching methods and activities to help students relate abstract mathematical knowledge to the real world, so as to enhance their ability to solve practical problems. At the same time, the use of modern educational technologies, such as multimedia and Internet resources, can provide students with more intuitive and vivid learning experiences, which will help them better understand and master these abstract concepts.[3]

4.2 Mastery of mathematical language and notation

Another notable difficulty is the mastery of mathematical language and notation. The language of mathematics has its own unique expressions and symbol systems, which is undoubtedly a considerable challenge for students who are used to expressing themselves in everyday language. Students need to spend a lot of time and energy to memorise and understand various mathematical symbols and terms, as well as the logical relationships between them. In the age of the Internet, although there is an abundance of online resources, how to make effective use of these resources to help students quickly and accurately master the language and symbols of mathematics is still a problem that educators need to solve. Educators must look for innovative ways, such as developing interactive learning platforms, using multimedia tools, and designing interesting mathematical games, to stimulate students' interest in learning and help them better understand and remember mathematical concepts. In addition, teachers should adopt diversified teaching methods in the classroom, such as case studies, group discussions and practical applications, in order to enhance students' intuitive experience and practical application of mathematical language and symbols. Through these comprehensive teaching strategies, students can gradually overcome their fear and confusion of mathematical language and symbols, so that they can take more solid steps on the road of mathematics learning.

4.3 Extensive calculation exercises

Extensive computational practice proves to be an integral part of the teaching and learning process in higher mathematics programmes. The subject of Mathematics places special emphasis on deepening the understanding and retention of mathematical concepts, formulas and algorithms through repeated computational exercises. Students must acquire various mathematical skills through continuous practice so as to enhance their ability to solve practical problems. However, in today's Internet era, the popularity of calculators and various calculation software has made students more and more reliant on these tools, which has to a certain extent undermined their ability to perform manual calculations, and at the same time diminished their interest in learning Mathematics. Therefore, how to find a balance in teaching that reasonably combines traditional manual calculation with the use of modern calculation tools, while stimulating students' interest in learning and improving their calculation ability, is a problem that needs to be paid special attention to and solved in the teaching of higher mathematics courses.

5. Blended Teaching Reform Strategies for Higher Mathematics Courses in the Internet Era

5.1 Development and Utilisation of Online Teaching Resources

With the rapid development of Internet technology, more and more online resources have been developed which can effectively complement and enhance the teaching and learning in traditional classrooms. For example, teachers can create

or introduce high-quality mathematical animation and simulation tools that help students understand abstract mathematical concepts in a visual way, such as illustrating the wonders of Euler's formula (Euler'sformula) through dynamic demonstrations. In addition, the use of MOOC (Massive Open Online Course) platforms, such as Coursera and KhanAcademy, allows for the sharing of higher mathematics courses from the world's top institutions, giving students access to a diversity of teaching styles and examples. At the same time, teachers can design interactive online quizzes and exercises to identify and solve the difficulties encountered by students in the learning process through an instant feedback mechanism. The use of these online resources can not only stimulate students' interest in learning, but also help them to better master their knowledge and improve their learning efficiency.

5.2 Adoption of flipped classroom teaching

Flipped classroom, as an innovative teaching model, has been widely used in higher mathematics courses. In this model, students learn new knowledge by watching elaborate videos or reading exhaustive materials before class, while class time is efficiently used for discussion, problem solving and deepening understanding. This approach reverses the traditional teaching process by shifting the knowledge transfer component outside the classroom, making the classroom a place of interaction and practice. Instead of passively receiving knowledge, students improve their critical thinking skills and problem-solving abilities through active learning and participation in classroom activities. The implementation of the flipped classroom requires teachers to carefully design pre-class learning materials and classroom activities to ensure that students are able to effectively master the basics before class, and further consolidate and expand this knowledge in class through teacher guidance and collaboration among peers. The role of teachers in the classroom has changed from the traditional ‘knowledge transmitter’ to ‘learning guide’ and ‘facilitator of problem solving’, which requires teachers not only to have solid professional knowledge, but also to have the ability to stimulate the interest and development of students. This requires teachers not only to have solid professional knowledge, but also to have the ability to stimulate students' interest and guide them to think deeply. In addition, the implementation of the flipped classroom also puts higher demands on students' self-management ability. Students need to arrange their own study outside class time, which not only tests their self-discipline, but also exercises their time management ability. In this way, students can not only master the necessary mathematical knowledge in the process of learning higher mathematics, but also develop the habit and ability of lifelong learning.

5.3 Project-based learning and case studies

Project-based learning and case-based teaching are effective ways to improve students' practical ability and innovative thinking. By combining mathematical theory with practical problems, students can deepen their understanding and application of mathematical knowledge in the process of solving specific problems. These two teaching methods encourage active participation. Through hands-on practice and teamwork, students can better master the course content and develop problem-solving skills in practice. Project-based learning usually involves a long-term, comprehensive task, which requires students to apply what they have learnt to complete a project of practical significance. Case teaching, on the other hand, focuses on understanding theoretical knowledge through analysing concrete cases, a method that helps students to concretise abstract concepts so that they can be absorbed and applied more easily. For example, in project-based learning, students may be asked to design a small business plan in which the principles of statistics need to be applied to analyse market data, or in case teaching, the teacher may introduce a real business case for students to analyse and discuss the mathematical models and strategies involved. Through such interactions and applications, students are not only able to see the direct application of mathematical knowledge in the real world, but also develop critical thinking and communication skills.[4]

6. Conclusion

In summary, in the Internet era, the blended teaching reform of higher mathematics courses is not only an innovation of educational technology, but also a profound transformation of educational concepts. Firstly, teachers need to re-examine the teaching objectives and clarify the respective advantages and limitations of online and offline teaching, so as to achieve complementary advantages. Secondly, students should actively participate in the teaching reform to enhance their independent learning ability and critical thinking. In addition, schools and educational institutions should provide the necessary hardware and software support to ensure the smooth implementation of blended teaching. Through the joint efforts of many parties, the blended teaching reform of higher mathematics courses in the Internet era will provide students with a more efficient and flexible learning experience, and cultivate more high-quality talents who can adapt to the needs of the times. Ultimately, this reform will promote the overall progress of higher education and inject new vigour into the development of society.

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