

Research on the Integrated Teaching Mode of Online and Offline in College Mathematics Teaching

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Abstract

College mathematics teaching can cultivate students' thinking ability, improve students' mathematical accomplishment, help students develop comprehensive mathematical ability, and contribute to students' future development. In the current college mathematics teaching, more emphasis is placed on the cultivation of students' independent inquiry ability. In order to improve students' ability of independent inquiry, many colleges have implemented the integration of online autonomous learning and offline classroom teaching to achieve the goal of cultivating students. This paper adopts the methods of literature research and comparative research to promote the development of online and offline integrated teaching mode of college mathematics. It firstly analyzes the current status of college mathematics teaching, then discusses the advantages of the integration of online and offline teaching mode, then analyzes the shortcomings of the current online and offline integrated teaching mode of college mathematics teaching, and finally puts forward suggestions to promote the development of online and offline integration teaching mode of college mathematics.

Keywords

College Mathematics, The Integration of Online and Offline Teaching Mode, Teaching Mode Studies

1. Introduction

Mathematics course is an important part of college education and an important course throughout students' study. The development of mathematics education can cultivate students' logical thinking ability and inquiry ability, which is bene-

ficial to students' lifelong development. At present, college mathematics and related courses are widely offered in Chinese colleges and universities, aimed at students of different majors, and the educational achievements are remarkable. However, with the development of education situation and the change of social demand for talents, the growth needs of students are also changing. Students need to have stronger logical thinking ability and self-development ability to become the talents needed by society. As a part of the teaching of thinking ability, mathematics teaching also needs to change accordingly, for example, to improve teaching methods, innovate teaching models, combine Internet technology and other paths that students are interested in, realize the integration of online and offline teaching, and promote the all-round development of students (Gao & Liu, 2021).

2. Analysis of Current Situation of College Mathematics Classroom Teaching

After many students enter college, they begin to study Advanced Mathematics and its related courses. Advanced Mathematics is a very difficult course generally reported by college students. Every year, a considerable number of students can not complete the study of Advanced Mathematics course. This exposes a major difficulty in college mathematics teaching: the learning content is very difficult, but the learning time and teaching methods are obviously insufficient. In order to solve this problem, it is necessary to start from the analysis of the teaching mode of college mathematics, first of all, to explain the current situation of college mathematics teaching. This part mainly uses the method of comparative research to compare the two modes of current college mathematics classroom teaching.

2.1. Traditional Teaching Model

Traditional teaching mode is a common mode in Chinese university teaching at present. In this mode, teachers are the dominant ones in the classroom, and they explain knowledge in the classroom, while students are only passive participants in the classroom, whose learning behavior and way of thinking are very dependent on teachers, and the motivation of students' learning comes from external instructions. Students' awareness of autonomous learning is insufficient, which can not become the internal factors for them to participate in mathematics learning (Li, 2022).

Traditional teaching mode has existed in Chinese mathematics teaching system for a long time. Many students have been used to this learning mode, and it is difficult for them to realize the transformation of thinking in a short time. The disadvantages of this teaching method will gradually become prominent in college mathematics teaching. Compared with compulsory education and high school education, college mathematics is more difficult and comprehensive, but the connection between teachers and students is decreasing. College teachers will

not “supervise” students’ learning behavior. In this case, in the face of gradually increasing course difficulty and more free learning time, if we still adopt the traditional teaching mode, only pay attention to the indoctrination of knowledge rather than the exploration of knowledge, we can not really improve students’ mathematical ability (Luo, Li, & Zhao, 2021).

2.2. Autonomous Learning Mode

Self-directed learning is currently the development direction of mathematics teaching in China. In every stage of mathematics teaching syllabus, it makes a request to self-directed learning, and points out that we should cultivate mathematical talents with the ability of self-directed inquiry. Compared with the traditional model, the self-directed learning model has obvious advantages. Under the guidance of internal factors, students can actively explore the topics they are interested in and find the appropriate development direction. This model is also more suitable for the college curriculum setting model. In the face of different elective courses, students can choose courses driven by self-awareness. Compared with teachers-students knowledge indoctrination, autonomous learning is obviously more in line with the current situation of college teaching.

However, it should be noted that the application of autonomous learning mode in college mathematics teaching also has certain disadvantages. First of all, there is great difference in self-learning ability of college students in China, which is influenced by the overall education situation. Some students have high autonomous learning ability and can arrange the learning content reasonably and arrange the learning time according to the learning objectives. However, most of the students’ autonomous learning ability is not strong. These students grow up under the traditional teaching mode, and it is difficult to adapt to the complete autonomous learning environment quickly. Some students even have the idea of self-abandonment and *laissez-faire*, which greatly reduces the learning effect. Secondly, in terms of course content, there are many contents in college mathematics courses, among which advanced mathematics, calculus, complex function and other contents are very difficult (Wang, Wang, & Zheng, 2021). If only relying on students’ independent learning without teachers’ proper guidance, many students can not accurately understand the learning content, and can not achieve the expected learning effect. Thirdly, from the perspective of teachers, there is less connection between college mathematics teachers and students. Teachers need to ensure the teaching effect on the one hand, and cultivate students’ learning ability on the other hand, which is difficult to achieve when there are few mathematics courses in college. Teachers can not timely inspect students’ learning outcomes, they only rely on the mid-term and final examination results to judge, thus the teaching effect is difficult to guarantee. Fourthly, in terms of assessment methods, the existing examination + daily score assessment model is also unable to achieve an effective evaluation of students’ autonomous learning ability (Rao, 2020).

3. The Advantages of Integrated Online and Offline Teaching Mode in College Mathematics Teaching

As mentioned above, both of the two models in college mathematics teaching have advantages and disadvantages. Both models exist in college classrooms at the same time, and are in the transition stage from the traditional model to the self-directed learning model. In order to adapt to the situation of college mathematics education, it is necessary to explore an appropriate education mode, which can not only guide the students who grow up under the traditional learning mode, but also adapt to the difficult requirements of college mathematics teaching. Therefore, the online and offline integrated teaching mode came into being. In the process of summarizing the literature, it can be found that the current academic circle supports the online and offline integrated teaching model.

The online-offline integrated teaching model is rooted in the development of Internet technology. With the enhanced application of Internet technology in all aspects of social life, it plays a greater role in classroom teaching. At present, many universities in China have introduced online teaching model, especially after the outbreak of COVID-19, the advantages of online teaching become more prominent. In online teaching, teachers can choose the corresponding course materials to send to students, and students can also choose the course materials independently. Teachers and students are connected through network, which strengthens the communication between the two sides and enables teachers to have a better judgment on the learning situation of students. In addition, students can actively communicate with teachers online, actively report learning results and actively discuss problems. Students can also form online learning groups to acquire knowledge through cooperative learning.

The emergence of online and offline integrated teaching model is an innovative development of offline traditional teaching model. The integrated teaching model expands the field of offline learning, enlarges the scope of classroom, and expands the learning time of students, which makes up for the shortage of mathematics class hours to a certain extent. Students can not only learn mathematics in limited classrooms, but also learn mathematics anytime and anywhere outside the classroom. Besides, students can also independently arrange the learning time and learning content.

The integrated online and offline teaching mode is also a supplement to online self-directed learning. The contents of college mathematics courses are diverse, and the mathematical knowledge contained in them is overwhelming and cannot be counted. In school teaching, only part of the knowledge is usually taught, and the teaching depth is different, and the learning difficulty is adjusted according to the different majors of students. The degree of students' desire for knowledge is also different. Some students do not like math courses and are not willing to learn further, but some students are willing to acquire new knowledge in addition to classroom learning. To ensure the full development of students, colleges should meet the needs of students' development and provide enough

space for their exploration spirit. Under the online and offline integrated teaching mode, no matter what development needs students have, they can use the power of the Internet to get enough support under the guidance of teachers, without worrying about the lack of teachers, lack of learning time, lack of peers and other embarrassing situations (Xi, 2021).

4. Problems Existing in Online and Offline Integrated Teaching Mode of College Mathematics Teaching

Online and offline teaching mode has attracted a lot of attention in recent years. Many colleges have started to try online and offline teaching mode, especially in mathematics teaching. According to the actual situation of mathematics teaching, a road of integrated online and offline development of college mathematics has been explored. However, there are still some problems in online and offline teaching, which hinder the development of online and offline teaching mode and are not conducive to the improvement of mathematics teaching results (Zhong & Ma, 2022).

4.1. The Choice of Teaching Content

In terms of the selection of teaching content, the online-offline integrated teaching model is a supplement to the development of traditional teaching and independent learning, so the selection of teaching content should meet two conditions. On the one hand, the teaching content should meet the development needs of students and should not be separated from the category of students' independent learning, otherwise it will be too difficult to effectively connect with the classroom learning content. On the other hand, the teaching content needs to have certain guidance and logic, and the formation of students' mathematical ability needs to be exercised. If we simply provide students with complex learning materials without judging the quality of learning materials, the efficiency of integrated teaching will be reduced.

However, in the current online and offline teaching mode, many teachers' choice of teaching content cannot reflect proper logic and guidance. Teachers have a deviant understanding of the concept of online-offline integrated teaching. They just take the integrated teaching as extracurricular extension teaching, but fail to pay attention to the guidance of online-offline integrated teaching on students' learning ability. They only pay attention to the superficial meaning of integrated teaching, but do not pay attention to the deep meaning of integrated teaching mode to students' self-growth.

In the integrated teaching model, teachers need to have the corresponding teaching ability and discrimination ability, and some colleges also have the problem of insufficient teachers. Teachers' professionalism cannot be guaranteed, and colleges does not provide relevant training for teachers' integrated teaching ability. Teachers completely rely on their own exploration in teaching, and colleges cannot provide corresponding support in terms of funds, technolo-

gy and courseware, which are also the key reasons why the online-offline integrated teaching model is not effective.

4.2. The Implementation of Teaching Methods

In terms of teaching methods, the online-offline integrated teaching model is a model formed to guide students' autonomous learning ability. Therefore, its teaching method also needs to be distinguished from the traditional teaching method. If the traditional teaching method is still followed, and the innovation of teaching method is not carried out according to the new teaching mode, the advantages of integrated teaching will not be reflected.

The problem of teaching method is reflected in the following two aspects. First of all, the online-offline integrated teaching model requires the joint participation of teachers and students, in which teachers play a guiding role, while students need to give full play to their autonomous learning ability. There is a new connectivity relationship between teachers and students, in which teachers can assign problems, but problems are not mandatory. Students can also communicate with teachers, which is not one-way. Under the integrated teaching mode of online and offline, students and teachers can realize diversified links. However, in the current integrated teaching model, teachers are still distant to students. Students can't communicate with teachers timely after class. Teachers can't respond to students' questions timely and effectively due to busy work, and students can't discuss with teachers at any time.

Secondly, under the integrated teaching mode of online and offline, the most important learning mode of students is inquiry learning. On the one hand, students need to form a good interactive relationship with teachers in class. Teachers and students carry out frequent discussions, summarize mathematical problems in the discussion, and students' mathematical ability is also cultivated as a result. On the other hand, outside the classroom, students and teachers can form study groups to independently discuss relevant math problems. In the current integrated teaching model, the characteristics of inquisitive learning are difficult to reflect, the atmosphere of mathematics classroom is still dull, students can not take the initiative to participate in the classroom, and most students will avoid the inquiry questions put forward by the teacher. In extracurricular research, many students choose more relaxed courses rather than learning math related knowledge

4.3. The Realization of Teaching Assessment

The mid-term and final examinations plus ordinary scores constitute the main aspects of the current college mathematics assessment. In some colleges, students' autonomous learning ability will be scored, but the basis of scoring is still inseparable from students' daily performance and homework completion, rather than a comprehensive evaluation of students' autonomous inquiry ability. Online and offline integrated teaching mode requires college mathematics teaching

to evaluate students in a more perfect way, which is far from being achieved.

In the online and offline integrated teaching model, teachers should cultivate students' autonomous learning ability, and also assess students' autonomous learning ability, set corresponding assessment methods for students' ability, and adopt personalized assessment indicators instead of uniform assessment indicators. To evaluate the individual development of students rather than the whole group of students is the development goal of college course assessment in the future.

Obviously, the current online and offline integration teaching is difficult to achieve this goal, in the aspect of hardware, college teachers' deficiency lead to the lack of objectivity in the assessment results, while in terms of software, the difference between the online and offline teaching ideas and methods lead to that the assessment indicators of this teaching model cannot be unified, and as a result, the assessment goals are difficult to achieve.

5. The Strategy of Integrated Online and Offline Teaching Mode in College Mathematics Teaching

Aiming at the problems in college mathematics teaching pointed out above, the optimization strategies are proposed as follows.

5.1. Choose Appropriate Content According to the Situation of Students

In order to meet the needs of students' inquiry learning, it is necessary to pay attention to the pertinence and guidance of the content in the content selection of online and offline integrated teaching. Pertinence means that teachers should choose the teaching content according to the actual situation of students' learning, not only according to students' different majors, but also according to students' different independent inquiry ability and willingness to learn mathematics, choose the teaching content of appropriate difficulty.

In instructive ways, teachers need to have a systematic cognition on university mathematics teaching content. Teachers need to analyze the connection between students' knowledge according to different teaching stages, to ensure that the teaching content is in the middle of the learning stage, so that students can use the knowledge to solve problems. The teaching content selected by teachers should have the corresponding depth of inquiry. The questions should not be too simple to arouse students' interest in inquiry, nor should they be too profound to be completed during class or group discussion.

5.2. Guarantee Independent Inquiry with the Help of Teaching Platform

In the integration of online and offline teaching, the realization of online teaching needs a certain teaching platform. In the current online teaching, the choice of platforms is fragmentary, which is not conducive to the improvement of communication efficiency between students and teachers. Therefore, schools

need to strengthen the construction of online teaching platforms instead of relying only on third-party software platforms. Colleges need to build their own teaching websites, record students' learning conditions with the help of big data technology, strengthen the support of resources, create an open sharing platform, concentrate superior resources, and provide a better learning environment for students.

The construction of the teaching platform needs to be related to the self-development of students, which is a continuous and expanded platform. In classroom learning, students can use the platform to refer to materials to support their statements. In extracurricular learning, colleges need to give students full access to the platform to reduce the restrictions in learning. Teachers need to pay more attention to the platform in teaching. For students who are not willing to participate in class discussion, the discussion platform can be opened and students can discuss anonymously. For the lack of group cooperation among students, a group communication platform can be set up to judge the behavior and contribution of students in group discussion.

5.3. Improve the Examination System and Develop Students' Personality

In the aspect of assessment system, it is necessary to improve the existing assessment system, pay attention to the protection of students' individual development, pay attention to students' personal development, and stimulate students' development with assessment.

First of all, the assessment method of college mathematics teaching should have higher flexibility, and the assessment indicators should be set according to the different situations of students. For example, the difficulty of assessment can be improved for students majoring in mathematics. For non-mathematics major students, the integration of their professional knowledge and mathematics can be examined. Teachers can design more flexible assessment methods to change the traditional assessment that only focuses on scores and does not pay attention to differences (Zhuang & Zhou, 2022).

Secondly, teachers should set up the examination content for inquiry-based learning. For example, in classroom inquiry-based learning, teachers should strengthen the observation of students, and reward students with higher classroom participation and better interaction effect. However, the assessment in group inquiry learning can be carried out by group members' scoring. The objectivity of the evaluation can be improved by the participation of group members in the evaluation of their performance in the group inquiry.

Thirdly, students could be assessed with the help of big data technology. Students' learning behaviors could be recorded on the teaching platform, and various learning behaviors of students could be analyzed with the help of big data technology, and corresponding evaluation indicators should be set, including students' login times, online learning time, and topic completion, etc. These indicators together constitute the investigation system of students' inquiry learn-

ing and are reflected in the final results of students.

To sum up, only through taking the content as the starting point, the teaching method as the means, the examination system as the guarantee, and using the whole teaching thinking way to treat the college mathematics teaching, can help the real development of the college mathematics teaching model.

6. Conclusion

This paper studies the integrated teaching mode of online and offline college mathematics teaching. With the development of society, colleges need to cultivate talents with stronger comprehensive quality, and the importance of mathematics teaching is becoming more and more obvious. In order to ensure the future development of students, college teachers need to carry out more in-depth research on the college mathematics teaching model, observe the current situation of mathematics teaching, dig mathematics teaching resources, analyze mathematics teaching methods, and update and upgrade the teaching model. The study of online and offline integrated teaching model in this paper can provide new ideas for the development of college mathematics teaching, and the analysis of problems in current college mathematics teaching can also improve the overall level of college mathematics teaching. In the context of the gradual transformation of mathematics teaching ideas, the online and offline integrated teaching model will play a greater role in future mathematics teaching.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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