

Application of Offline and Online Hybrid Mode in Linear Algebra Teaching

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Abstract: This paper discusses the application of offline and online hybrid mode in linear algebra teaching. The "Linear Algebra" course, as a primary compulsory course for Technology empowerment, economic management and financial evaluation, has relatively clear knowledge, ability and quality requirements in the talent training process. It is relatively helpful in improving students' problem solving and logical ability. However, the content of linear algebra is abstract, and students are afraid of difficulties in learning it, which affects the teaching quality and effect of the course. Combined with the pan-ya teaching platform, this project completed the construction of offline and online mixed teaching related materials and online course resources for the "Linear Algebra" course in the context of big data, and relied on big data technology to implement online courses during the teaching process. The hybrid-teaching model integrates the advantages of offline and online teaching methods. Therefore we can truly achieve the effective learning of student-centered and teacher-led, which can help us to teaching of mathematical ideas, cultivate innovative abilities and practical college students. The success of the hybrid of linear algebra also provides a reference for other public basic courses.

Keywords: Linear Algebra; Offline and Online; Hybrid Mode; Teaching

1. Research Status and Background Analysis

With the rapid development of data and intelligence, linear algebra has become a necessary and important tool course for college students due to its wide application in the fields of technological empowerment, economic management and financial

evaluation. The incubation of practical and innovative talents is a necessary condition for the survival of applied undergraduate colleges. As a local, applied undergraduate college, it is the school's goal to cultivate students' application abilities and improve their Practical ability. Linear algebra is an important public basic required course offered by private universities. It is an important theoretical tool to support students to learn professional courses well, and is the cornerstone of building an applied talent training system. Currently, the class format and assessment method of this course are relatively simple, and the course content It is more theoretical than practical, has few class hours and heavy teaching tasks, and students have weak practical ability, therefore students do not master well.

By the practice and application of hybrid teaching mode in Transportation System Planning, Huang Chunmei [1] demonstrated how to efficiently use classroom learning time (before, during and after class) to improve teaching efficiency, and analyzed how to optimize teaching design and cultivate students' active learning ability combine with students' learning situation. Shi Yuelian [2] pointed out some problems in the teaching of linear algebra courses, and proposed that teachers should adjust teaching content according to students' conditions, improve teaching methods, provide good exercise classes, reform assessment methods, and strengthen students' ideological and political education, etc., to improve teaching. Quality and cultivating applied talents; Zhao Lin [3] proposed that information technology provides more possibilities for innovation and reform in college teaching. Linear algebra, as a mathematics course closely connected with computers, can make good use of online data and mathematical experiments to integrate course content, and practice a mixed mode of offline and online. Assisted by differentiated

teaching modes, computer technology can promote classroom teaching reform. Che Guofeng [4] proposed from the interesting perspective of the "Linear Algebra" course that by introducing modern teaching models and updating teaching skill during the process, students can actively and interestingly Study this course; Liang Jing[5] believed that linear algebra plays a formation role for students' thinking ability, logical reasoning ability, induction and summary ability and innovation ability, but it is also a subject with extremely abstract concepts and theories for students. Hong Shaoyong [6] proposed that in the context of the popularization of network technology, in order to coincide with the emergence of new industries and new technologies, new engineering disciplines have emerged. To cope with the new needs that the construction of new engineering disciplines has put forward for existing professional talents, all universities are carrying out corresponding reforms; Feng Jie [7] proposed that universities should formulate teaching objectives for linear algebra courses, adopt heuristic teaching models, and deeply explore this subject. The course is connected with spatial analytic geometry and advanced mathematics, using mathematical modeling thinking and adding mathematical experiments to cultivate students' learning hobbies and enhance the efficiency and quality of talent training; Qin Lihua [8] combined the subject characteristics of economics and management majors to provide an idea, which rely on big data technology to reform the teaching philosophy and teaching methods of linear algebra courses; Shan Xian[9] proposed that Combine the "Internet" with "Education" according to the current teaching status, he proposed to take advantages of the Internet to realize the implementation plan of the teaching philosophy of linear algebra course. Yang Wenxia [10] discussed the practice of blended teaching of linear algebra based on SPOC and flipped classroom

At present, linear algebra teaching in most private universities is mainly classroom teaching led by classroom teachers. Teachers explain and impart knowledge through a combination of multimedia courseware, oral narration and blackboard writing. This type of model has the following problems:

(1) Poor teaching effect and cannot truly serve

practical personnel training. The mathematics foundation of students in private colleges, and in most cases they are in the process of passively accepting knowledge. In addition, traditional courses are mainly theoretical explanations, and the mode is relatively monotonous, which cannot stimulate students' vitality, resulting in low teaching efficiency, poor teaching effect, and inability to really exploring the essence of the curriculum will not serve the purpose of practical personnel training.

(2) The teaching hours are tight and the teaching pressure is high. The linear algebra course has "innate" subject characteristics such as a large amount of teaching content, tight time and difficult knowledge points. However, in order to leave more learning time for professional courses, the course is set up for 32 class hours, mainly teaching the main teaching content, to ensure that the teaching task is completed within the specified time, and students do not have enough time to digest and absorb new content. The unresolved content during the lecture cannot be digested in time. Round and round, a vicious circle is formed, and students are unable to learn the course well and no longer want to learn the course well.

(3) The implementation of curriculum process evaluation is unreasonable. The linear algebra course assessment has currently introduced process assessment and set its proportion to the total score to forty percent. However, the assessment of linear algebra courses has introduced the process assessment and set its proportion to 40% of the total score, but the course assessment link is still not reasonable, and the assessment results lack certain supporting data and quantitative processing, which cannot fully reflect the usual performance of students.

Combined with the pan-ya teaching platform, this paper discuss the application of offline and online hybrid mode in linear algebra teaching. The hybrid teaching model integrates the advantages of offline and online teaching methods. Therefor we can truly achieve the effective learning of student-centered and teacher-led, which can help us to teaching of mathematical ideas, cultivate innovative abilities and practical college students.

2. Hybrid Model Design

After fully studying the requirements of linear

algebra courses in the big data mode, and under the condition of full communication between schools and enterprises, we will implement linear algebra course teaching reform by the new media.

(1) With the help of micro-video to assist classroom teaching. Take advantages of micro-video, and make corresponding short videos (generally no more than 10 minutes) of the teaching important and difficult points in the course, stored in the Pan-Ya teaching and studying platform to assist teaching, so that students can choose to study based on their own learning situation. For example, the content about non-homogeneous linear equations is an important content in the linear algebra course, and For content that is difficult to master, you can record it into three short videos: the first is the concept and properties, the second is giving specific solution methods, and the third is explaining the application of non-homogeneous linear equations based on input-output problems. In addition, micro-videos can also be produced on mathematics culture, mathematics history and the application of mathematics in life to enhance students' learning enjoyment.

(2) Use Pan-Ya online platform to activate the classroom atmosphere. By using Pan-Ya online online platform to produce online open course resources (lesson plans, courseware, micro videos, question banks, exercises and discussions, etc.). Teachers arrangement important tasks through the Pan-Ya online platform before or during class to guide students to learn independently. Students record and feedback questions to the teacher through learning, which facilitates targeted teaching; the online platform is used to publish classroom activities during class. On the one hand, Mobilize students' enthusiasm for learning; on the other hand, timely test the effectiveness of classroom teaching, promptly serve classroom teaching, and truly be student-centered and outcome-oriented.

(3) Use online teaching platforms to increase after-class exchanges between students and teachers. Teachers use the online teaching platform to receive and send teaching tasks, and students complete the tasks. You can get some experience and encouragement after finishing the work; At the same time, you can set up the platform so that all students' homework can be viewed by each other,

students can self-evaluate their homework, and they can also use the discussion forum to communicate with each other and borrow learning experiences; Teachers can use their free time to make corrections at any time Students' homework, and timely feedback to students on problems that arise in their homework, to avoid the long and untimely feedback problems of traditional offline teaching.

(4) Use online teaching platforms to improve the quantitative processing of process assessments. In the "final assessment and process assessment" format adopted in the early stage, the process assessment was not quantitatively handled in place, and some links were just a formality, which could not truly reflect the students' daily performance, and the assessment was unreasonable. Through the online teaching platform, students' roll call and attendance rate, classroom answers, discussions, tests and examinations can be timely counted in a quantitative form that reflects their learning attitude, learning process and learning effect, which are counted in a timely manner in a quantitative form to provide teachers with precise guidance for process assessment and truly reflect the students' daily learning level.

Based on the teacher team of "Linear Algebra" course in the school, this paper conducts in-depth research on the problems existing in the t "Linear Algebra" course, finds out the solution to handle the problems through theoretical and practical analysis, and finally completes the mixed teaching design of "Linear Algebra" course with the help of enterprises. The specific implementation path is shown in Figure 1 below:

3. The Goal, Prominence Point, Achievement and Next Work of Hybrid Mode

3.1 The Goal of Hybrid Mode

(1) Carry out innovations in course content, course methods and course assessment according to the characteristics of the disciplines and majors. The first is to update the course content and assessment methods based on the actual course, introduce real problems to solve in real life, and create a new type of heuristic, interactive, and intelligent linear algebra classroom; the second is to

conduct extensive assessment according to the requirements of the school's classroom teaching reform implementation plan Method reform, implement all-round assessment models in the form of stage tests, group assignments, process papers, mind maps, etc., change the original assessment model of "one

test determines life or death", and realize in-depth reform of linear algebra. And through specific teaching practices, we will improve the periodic assessments to cultivate students' innovative spirit, so as to achieve the purpose of improving the quality of curriculum teaching quality and cultivating applied talents.

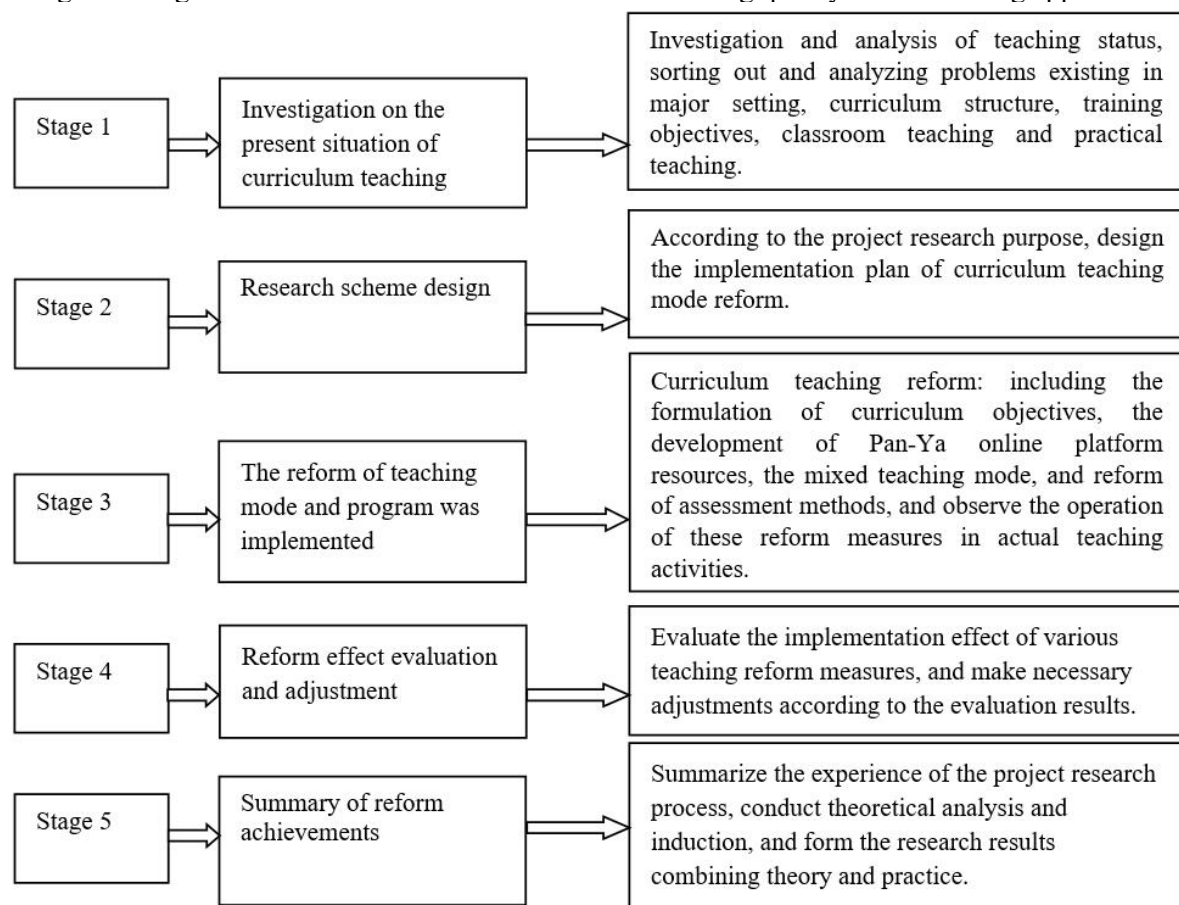


Figure 1. Implementation Path of Mixed Teaching

(2) After fully studying the requirements of linear algebra courses in the big data mode, the case teaching resource library is updated. Introducing practical problems into teaching, the problem-oriented approach guides students to use linear algebra knowledge to solve related problems, and enhances students' Motivation and creativity in learning the course. The rise of big data and artificial intelligence technology not only provides new technical means and methods for social development, moreover it changes people's thinking and social environment. Big data can reflect effective statistical laws and can make it expediently to find ways for students to learn linear algebra well. Focus on promoting the effective implementation of blended teaching reform in mathematics courses.

(3) Produce linear algebra online teaching

resources to change the existing teaching model. Establish an online resource construction team for linear algebra courses and work with enterprises to jointly develop and record linear algebra online course resources, gradually realize full changes in the presentation of course content, course methods and students' learning methods, and teaching interaction models, and transform the traditional teacher-centered teaching to student-centered learning. change. Linear algebra course use Pan-Ya online teaching platform, integrate and optimize course resources, and adopt an offline and online hybrid teaching model to help teachers organize and implement teaching, adopt the hybrid advantages of offline and online, improve the effect of higher mathematics teaching, and enhance students' learning

interest and learning outcome, and implement the fundamental mission of cultivating people with moral integrity.

3.2 The Prominence Point of Hybrid Mode

(1) Hybrid mode is was successfully tested in linear algebra courses. One is to adopt the form of situation introduction and problem introduction to restore the development process of things and stimulate students to explore the process. The second is to adopt the open question mode, reasonably set novel and interesting questions, problem-oriented, and cultivate students' problem-solving ability. The third is to actively engage students in learning activities in learning activities, so that students can achieve positive interaction with teaching, and give play to students' subjective motivation and creativity. The fourth is to use scattered and irregular time to learn, and change the dual limitations of offline teaching in time and space, transform the way of knowledge acquisition, and truly realize "fragmented learning".

(2) Linear algebra is widely used in engineering, computer science, mathematics, physics, biology and other disciplines. Considering that students are of different majors, students are encouraged to explore online teaching resources independently, deepen their cognition of linear algebra, and further deepen teachers' classroom efficiency and teaching quality. At the same time, cultivate students' independent inquiry learning. Meanwhile, considering the the difficulty and degree of the application of the content of linear algebra in the professional field, different class hours are distinguished. If teaching hours are not increased, it is suggested to increase the proportion of credits of students' independent learning after class, to help students master electronic learning through the Internet.

3.3 The Achievement of Hybrid Mode

(1) Funded by Baike Jinding (Shandong) Network Technology Co. LTD., we completed the production of relevant materials of offline and online hybrid mode of Linear Algebra by leveraging big data and artificial intelligence technology, including teaching syllabus, teaching plans, courseware, case database, homework question database, online teaching

platform and other materials.

(2) Completed key online teaching videos of linear algebra courses and improved the construction of online course resources.

(3) According to the effect of curriculum reform, complete the research report on blended teaching curriculum reform of Linear Algebra by leveraging big data and artificial intelligence technologies for optimizing the use of teaching reform.

(4) Build an excellent team of teachers who can enhance the quality of course by using the offline and online hybrid mode.

3.4 The Next Work of Hybrid Mode

(1) Introduce BOPPPSE or OBE teaching concepts into offline and online hybrid mode to improve course quality and student learning effects, and help cultivate practical talents;

(2) With the help of big data technology, the ideological and political elements of the course are better integrated into the offline and online hybrid teaching, and the ideological and political courses go in the same direction to fulfill the fundamental mission of cultivating people with moral integrity;

(3) Combined with the academic situation of students in private universities, we will improve the quality of online resources in the later teaching practice, optimize the offline and online hybrid teaching method, and promote it to other university mathematics courses (advanced mathematics, calculus, probability theory and mathematical statistics and used in discrete mathematics, etc.).

4. Summary

This paper discussed the construction of offline and online blended mode in linear algebra teaching. Through Pan-Ya online platform, we can achieve a mix of offline and online teaching, and promote the reform of the teaching system of mathematics courses and train teachers to use Pan-Ya online platform. The ability of technology-assisted teaching helps teachers better impart mathematical knowledge, penetrate mathematical ideas, cultivate students' independent learning and innovation abilities, and serve to cultivate applied talents. Meanwhile, based on the construction of Pan-Ya online platforms, students at different levels can achieve "on-demand, independent learning", effectively supplement in-class learning, sublimate

extracurricular teaching and after-school learning, and optimize the improve the course teaching quality.

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