

Construction of “Five-micro-in-one” Blended Golden Course of *Advanced Mathematics*

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Abstract

At present, the teaching of the course *Advanced Mathematics* in colleges and universities has many problems, such as excessive contents for classroom teaching, tight class hours, teaching limited in the classroom and affected learning initiative of students. In this paper, starting from the background of educational informationization and the practical problems in the teaching of the *Advanced Mathematics*, the existing teaching and learning problems could be partly solved by the construction of the “five-micro-in-one” online and offline blended golden course of the *Advanced Mathematics*, i.e. the course integrates micro-video, micro-teaching design, micro-interaction, micro-textbook and micro-exercises into one, with textbook content as the supporting point and the revolution of the “student-centered” learning style as the power point and on the basis of the in-depth analysis of teaching content and course system.

Key words: Five-micro-in-one; Online and offline blended golden course; Construction

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INTRODUCTION

The *Key Points of the Work of the Department of Higher Education of the Ministry of Education in 2019* pointed

out that the “double ten thousand program” for first-class courses (golden courses) should be implemented, namely, constructing around 10,000 national first-class courses and around 10,000 provincial first-class courses, including online and offline blended golden courses. As the main developer and implementer of educational informationization, teachers in colleges and universities should conform to the development trend of educational informationization and promote the construction of digital teaching resources. Now there are few research results on the golden course of the *Advanced Mathematics*. Liu Cunxia (2019) explored the ways to construct the golden course of the *Advanced Mathematics* based on the course requirements of the *Advanced Mathematics* and students’ learning characteristics, around the construction of online teaching resources and by optimizing the course content, strengthening the construction of online resources, strengthening the reform of teaching mode and focusing on the reform of examination methods. (Liu, 2019) Wang Lidong proposed to promote students’ innovative thinking in the teaching of the *Advanced Mathematics*. (Wang, et al, 2019) Huang Yonghui thought deeply about the teaching reform of the integration of “Mooc” into the *Advanced Mathematics*. (Huang, 017) Such studies provided important insights for the development of the project. However, now there still are the following problems in the teaching of the *Advanced Mathematics* in colleges and universities: excessive contents for classroom teaching and tight class hours, making the classroom content confined to the textbook, and the applicability of the knowledge unable to be effectively expanded; the teaching confined to the classroom and the limited time and space affect students’ ubiquitous learning. The teaching quality can be improved by developing “five-micro-in-one” blended teaching. The R&D, design and production of “five-micro” resources have enriched the teaching content and improved the high order and innovativeness of the course and teachers’ professional

quality. The development of online and offline blended teaching on this basis has improved the challenge of the course and stimulated students' innovation potential and study initiative.

1. SIGNIFICANCE OF THE CONSTRUCTION OF "FIVE-MICRO-IN-ONE" BLENDED GOLDEN COURSE OF *ADVANCED MATHEMATICS*

The construction of the online and offline blended golden course of the *Advanced Mathematics* with high order, innovativeness and challenge is of great significance.

- Improving teachers' teaching level: The R&D and design of micro-video, micro-teaching design, micro-interaction, micro-textbook, micro-exercises and other teaching materials and the development of online and offline blended teaching mode improved the challenge of the course, put forward higher requirements for teachers' professional level and modern educational technology level, which could promote teachers' in-depth analysis and reflection on teaching content and improve their teaching level.

- Stimulating students' innovation potential: The mathematical concept that "Mathematics comes from real life and applies to real life" was established, by stressing the applicability of the *Advanced Mathematics* in the flipped classroom, for students to let them feel the infinite charm of mathematics and make the boring mathematics course vivid, which improved students' interest in learning and enhanced their ability of independent learning and innovation.

- Enriching digital teaching resources: The project implementation plan was developed; and the course content with applicability and frontier were selected for compiling micro-textbook, realizing the accurate analysis of key and difficult points. The needs of different levels of students could be effectively met by micro-video and micro-teaching design. Attention was paid to the individualized teaching of students, enabling them to have deeper understanding of mathematical principles and ideas, improving the high order and innovativeness, and greatly enriching the digital teaching resources of the *Advanced Mathematics*.

- Promoting student-centered teaching reform and optimizing the learning style. The learning content was microminiaturized by micro-lecture, which is beneficial to provide fragmented and mobile dynamic learning experience for students. The knowledge points of the *Advanced Mathematics* were made into micro-lectures; 4-5 micro-lectures formed a theme, facilitating students to connect and contrast knowledge points and allowing them to grasp the content from a higher level and effectively improve the learning efficiency.

- Promoting the generation of interactive teaching mode and improving teaching quality: Carrying out online interactive teaching activities between teachers and students through micro-lectures is in favor of the generation of interactive teaching mode for the *Advanced Mathematics*. The interactive teaching mode regards teaching as a dynamic and developing process of interaction between teaching and learning. It is a teaching structure mode that can form harmonious teacher-student interaction, student-student interaction and the interaction between learning individual and teaching intermediary by optimizing "teaching interaction", so as to generate teaching resonance and improve the teaching effect.

2. CONTENTS OF THE CONSTRUCTION OF "FIVE-MICRO-IN-ONE" BLENDED GOLDEN COURSE OF *ADVANCED MATHEMATICS*

The construction of "five-micro-in-one" online and offline blended golden course of *Advanced Mathematics* can be developed from the following five aspects:

- Production of micro-video: Based on the in-depth analysis of the teaching program and textbook of the *Advanced Mathematics*, in combination with the team's teaching experience and students' feedback, and according to the key and difficult points and confusing points of teaching, 4-5 micro-lectures form a theme for the production of micro-videos to provide students with high-quality online video resources. The learning content is microminiaturized by micro-video, which is beneficial to provide fragmented and mobile dynamic learning experience for students.

- Construction of micro-teaching design: For micro-videos which are difficult for students' independent learning, the corresponding micro-teaching design (including teaching background, learning condition analysis, teaching objectives, key and difficult points of teaching, teaching method, teaching process and teaching evaluation) should be offered to provide guidance and help for students to effectively learn such micro-videos.

- Construction of micro-interaction Students' doubts can be solved by raising open questions online for students, discussing online with them and listening to their ideas. Micro-interactions solve students' doubts online, forming favorable teacher-student and student-student interactions, improving students' sense of participation and promoting the continuous innovation of teaching content.

- Construction of micro-textbook: The effect of flipped classroom will be greatly discounted if students cannot sufficiently grasp the malleability and applicability of the knowledge taught by micro-video. Therefore, micro-textbook is based on the supplement of the applicable

knowledge, frontier knowledge and innovative knowledge associated with the *Advanced Mathematics*. On this basis, the contents suitable for flipped classroom may be selected and compiled into the micro-textbook as the supplement of micro-video to effectively expand the capacity of classroom teaching, providing good materials for offline flipped classroom and providing differentiated help for students.

- Construction of micro-exercises The micro-exercises include online unit test

paper and final exam item database and offline exercises (a certain percentage of non-standard answer questions is set in the exercises for each chapter). The micro-exercises are designed to cultivate students' innovative ability, reconstruct students' thinking space, and test students' learning effects.

The key problem to be solved in the construction of blended golden course is the effects of students' online learning and offline flipped classroom. High-quality micro-video, micro-teaching design and favorable micro-interaction are the fundamental guarantee for students' getting good teaching effects online. This requires the teacher team to analyze and process key and difficult points and confusing points. On this basis, high-quality micro-videos need high-quality shooting and courseware and teachers' wonderful lectures. During students' online learning, the teacher team should spend more time interacting with students online to generate teaching resonance and improve online teaching effects. At the beginning of the course, teachers should give students professional guidance on how to learn online, which requires teachers themselves to be very familiar with online learning software and process. Moreover, high-quality micro-textbook is an important factor for the smooth offline implementation of flipped classroom. This requires the teacher team to ensure the in-depth collection of the application of the *Advanced Mathematics* in construction, bridge engineering, traffic and other aspects of real life, supplement the frontier and innovative knowledge associated with this course, strengthen the combination with the history of mathematics and elaborately design the teaching content to write high-quality micro-textbooks, effectively expand students' knowledge and provide effective help for carrying out flipped classroom.

3. CHARACTERISTICS OF “FIVE-MICRO-IN-ONE” BLENDED GOLDEN COURSE TEACHING PARADIGM OF *ADVANCED MATHEMATICS*

This teaching paradigm can start from the background of educational informationization, be based on the requirements for the high order, innovativeness and challenge of the golden course, grasp the main problems in teaching, carry out teaching reform and is innovative and effective. New learning space will be provided for students by designing and producing high-quality online teaching resources and utilizing the offline teaching platform Wisdom Tree to guide students to learn independently, turn “requiring me to learn” to “I want to learn”, and promote the generation of the student-centered teaching.

Setting a certain percentage of non-standard answer questions in “micro-exercises” and emphasizing tapping the innovative potential of students: “Micro-teaching design” can provide help for students' learning “micro-videos” online. “Micro-textbook” can provide resources for offline flipped classroom. The construction of five-micro resources has greatly enriched the construction of digital resources and laid solid foundation for carrying out blended teaching.

The construction of the “five-micro-in-one” blended golden course of the *Advanced Mathematics* can follow the basic rules of higher education, strengthen application and practice and emphasizing effectiveness and process assessment, and is feasible and operable and of promotional value inside and outside the school.

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