

Research on the Construction of Discrete Mathematics, a New Form of Integrated Media Textbook

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Abstract: *The continuous development of information technology not only changes the form of teaching and learning, but also promotes the continuous innovation and transformation of traditional teaching forms, and develops to more and more modern teaching forms. At present, the education model is constantly changing, and the teaching materials can no longer meet the needs of education to a certain extent, so the development of integrated media teaching materials has been in an imminent state. This paper introduces the current situation, research content, goals and problems to be solved in the construction of integrated media textbooks, and puts forward the reform plan and promotion and application value of the construction of discrete mathematics integrated media textbooks.*

Keywords: *Convergence Media, Higher Education, Discrete Mathematics, Teaching Materials*

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I. Background and significance

1) Research status at home and abroad

In order to meet the demand for talents for economic development, the talent training mode and teaching mode of higher education are undergoing profound changes, and higher education is facing new opportunities and challenges. With the deepening of higher education, the quality and function of textbook construction have attracted much attention, and the traditional textbooks based on paper version are being replaced by financial media textbooks, and the construction of financial media textbooks has played an important role in optimizing teaching resources, improving teaching quality, and promoting the reform of teaching mode. The concept of integrated media textbooks originated from integrated textbook/coursebook, and has been translated as "integrated textbooks", "three-dimensional textbooks", "diversified textbooks" in China, and "integrated media textbooks" until recent years, and first appeared in the Ministry of Education's "Several Opinions on Strengthening Undergraduate Teaching in Colleges and Universities and Improving Teaching Quality" in China in 2001.

With the popularization of computers and the promotion of multimedia teaching, the teaching method has undergone a great change, from the traditional dictation, chalk board book, reading paper version of the textbook, to the use of multimedia sound, image, video, text computer display, with dictation, board book and paper version of the textbook, has been developed to the present use of online video courses for preview and review, the use of mobile phone software in the classroom for real-time test questions and answers, the use of online homework platform after class for homework assignment, Completion and correction, such a series of information-based teaching methods with oral teaching, board books and paper textbooks synchronous teaching work teaching mode. It can be seen that the change of teaching methods has also prompted publishing houses to gradually develop towards the trend of providing integrated media teaching materials. The true meaning of integrated media teaching materials refers to the main textbooks, teachers' reference books, student guides, electronic teaching plans, online courses, test question banks, etc., which are suitable for diversified teaching applications designed in accordance with the advanced integration idea of computer and network as the support platform, the collection of rich teaching resources of colleges and universities, the use of a variety of new teaching tools, and the collection of teaching content, teaching methods, teaching priorities, and teaching effects. Compared with the traditional text and printed materials, the integrated media teaching materials integrate books, tapes, videos, CD-ROMs, multimedia courseware, and online courses, integrate the strengths of various teaching methods, combine sound, image, video and other information input methods, and cooperate with the teaching process from multiple angles, directions and levels, so that teaching and learning have been greatly expanded in reality and space.

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In recent years, the development of convergent media textbooks has been rapid, but there are also many problems in the construction, taking discrete mathematics convergent media textbooks as an example, which are mainly manifested in the following aspects:

- (1) The number of discrete mathematics integrated media textbooks is not large, except for a few classics, the quality of others is average, the pertinence is not strong, and it cannot better meet the actual needs of teaching.
- (2) Many of them do not provide integrated media teaching resources, which do not conform to the cognitive laws and thinking processes of students, are not easy for teacher-student interaction, and do not meet the requirements of new teaching models such as "student-oriented" and "OBE".
- (3) The construction and development specifications of integrated media teaching materials are not uniform, the versatility is poor, the integration with teaching content is difficult, and the utilization rate is low.
- (4) The construction of integrated media teaching materials is not interactive and interactive, which cannot meet the needs of students' independent learning.

Therefore, how to optimize and improve teaching resources and develop discrete mathematics integrated media textbooks suitable for teaching and use, which is conducive to improving the teaching effect and improving the quality of professional training, will be an important part of the research of this project.

It is an important way to improve the quality of teaching by compiling high-quality teaching materials and carrying out the construction of informatization and digital resources of courses. This project will focus on the construction of integrated media teaching materials for discrete mathematics courses, and effectively improve the quality of teaching through the development and sharing of teaching resources.

2) Research implications

Discrete mathematics is a compulsory basic course for undergraduate students majoring in science and engineering, economics and management in colleges and universities, with a large number of students and a wide range of students. This project is to study and practice the practical problems that are not standardized, unsystematic, large in quantity, average in quality, weak in pertinence and practicability, and cannot meet the teaching needs in the construction of discrete mathematics integrated media textbooks in colleges and universities, and seek ways to build high-quality teaching resources, and explore a new path for the construction of teaching resources and the improvement of connotation in colleges and universities. The construction of integrated media teaching materials is the integration and optimization of teaching resources, technical resources and teaching implementation process, which is the fundamental guarantee for improving professional connotation and teaching quality, and is the first element of the construction of the school's soft environment. The development results of the teaching resources of this project are replicable and can be used for the construction of integrated media teaching materials for other courses, which shows that the research of this project has valuable reference value for the construction of integrated media teaching materials for other courses, and has a wide range of application prospects.

II. Research content, objectives, and problems

1) Research content:

This project will focus on the construction of integrated media teaching materials for discrete mathematics courses, develop, optimize and share teaching resources, integrate and optimize technical resources and teaching implementation, and effectively improve the teaching connotation and teaching quality.

2) Research Objectives:

(1) Compile and publish discrete mathematics textbooks. Guiding the reform of the curriculum with the new form of teaching ideology, rearranging the teaching content from the perspective of cognitive laws, constructing the curriculum system according to the needs of practical application, integrating a variety of media methods to facilitate students' independent learning, establishing a common basic content platform for the compulsory courses of each major, setting up a basic content ladder for elective courses that are closely related to the learning of professional courses and the needs of vocational positions, and setting up a ladder of targeted optional professional knowledge content that is related to the needs of students' own development.

(2) Develop supporting materials for integrated media teaching materials, including: online course websites, assignments, unit test questions, final review question banks and their answers, experimental course content and source code, curriculum plans, electronic lesson plans, teaching guidance resources, etc. In order to adapt to the teaching and use of discrete mathematics in different majors, improve the teaching quality and teaching effect of discrete mathematics, promote the reform of discrete mathematics courses in higher education, and reflect the teaching mode of new forms of higher education.

(3) Optimize the construction of discrete mathematics network platforms, including: Wisdom Tree Discrete Mathematics (Shandong Alliance) online course platform and Chaoxing operation platform. The wisdom tree platform includes teachers' teaching videos, curriculum construction introductions, teaching

dynamic releases, teacher-student Q&A interactions, flipped classroom content, course questions, unit tests, final question banks, and teaching resources;

(4) Summarize the results and write papers, promote the teaching results, and expand their popularization and application.

3) Key issues to be solved:

(1) How to improve the practical application of discrete mathematics and train students' ability to combine theory and practice;

(2) How to integrate and highlight the characteristics of its integrated media teaching materials;

(3) How to optimize the online course platform and homework platform;

and (4) how to disseminate research experience and results.

III. Reform programs and solutions to problems

1) Reform program design

This project will conduct research and practice on the practical problems existing in the current construction of discrete mathematics integrated media textbooks in colleges and universities, which are not standardized, systematic, large in quantity, average in quality, weak in pertinence and practicability, and cannot meet the teaching needs, and seek ways to build high-quality teaching resources, and explore a new path for the construction of teaching resources and the improvement of connotation in colleges and universities. Through the integration and optimization of teaching resources, technical resources and teaching implementation process, the construction and optimization of integrated media teaching materials and their supporting resources, enhance the professional connotation, and improve the fundamental guarantee of teaching quality. In addition, the valuable experience and achievements of the construction of integrated media teaching materials obtained by the project will be actively promoted and applied, so as to maximize the application scope of the project. These include:

(1) In view of the current situation that there are not many discrete mathematics convergence media textbooks in colleges and universities, which cannot well meet the actual needs of teaching, new forms of convergence media textbooks to meet the current needs are rewritten.

(2) In view of the fact that most of the current teaching materials do not provide information-based teaching resources and do not conform to the new teaching mode, the construction and optimization of "Internet +" supporting teaching resources should be further deepened and optimized.

(3) In view of the problem of inconsistent and poor versatility in the construction of integrated media textbooks, the development specifications for the construction, use, update and management of discrete mathematics textbooks are studied.

(4) In view of the shortcomings of the weak interactivity of the construction of integrated media teaching materials, the use of tools and methods for the teaching of integrated media teaching materials should be expanded, the interaction with students should be enhanced, the ideological and political content should be increased, the interest of students should be stimulated, the autonomy of learning should be improved, and the scope of promotion and application should be expanded to enhance the practical scope of teaching materials.

2) Ways to solve the problem

(1) Computer-based experiments are added to the discrete mathematics textbooks to improve the practical applicability of discrete mathematics and train students' ability to combine theory and practice.

(2) Integrate the elements of "Internet +", such as: provide supporting materials in the form of QR codes in the textbooks.

(3) Optimize the online course platform and homework platform, such as: increasing learning materials that can arouse students' interest and improving the interactivity of online questions and answers.

(4) Add rich and colorful ideological and political content to the teaching content, summarize the research results into papers for publication in real time, share the research experience of the project in a timely manner, and promote the research results.

IV. Innovations and expected results

1) Innovation

(1) The content and form of research results are suitable for the characteristics of undergraduate higher education

The research content of this project comprehensively demonstrates the basic ideas, methods and skills of solving practical problems in discrete mathematics, with rich supporting materials and a combination of theory and practice. The content organization form is from shallow to deep, step by step, which is not only convenient for students to learn actively, but also conducive to improving students' practical problem-solving and programming operation ability, on the basis of helping students understand and master basic knowledge,

improve students' logical analysis, abstract thinking, practical application problem solving and programming ability, and cultivate students' comprehensive ability.

(2) Comprehensively reflect the teaching concept of new engineering and application-oriented undergraduates. On the one hand, the research of this project follows the guiding ideology of science and engineering courses with the "discipline system" as the clue, and takes the concept and theory as the main line in the knowledge structure of the research results. On the other hand, in order to highlight the cultivation of comprehensive application ability of technology, strengthen the practical application ability and practical operation and skill training, in order to focus on the training of students' practical ability, the training of students from a solid grasp of basic knowledge to learn the positioning, analysis and solution of practical problems is gradually cultivated.

(3) Comprehensively embody the concept of information-based teaching reform in the new era

The project's integrated media teaching materials, supporting resources, and course platforms are all integrated with the characteristics of "Internet +", including: the chapters, experiments and exercises of the textbooks provide source code, answers and other content in the form of QR codes, and readers can read and use more abundant supporting resources by scanning the QR code; It not only combines the characteristics of the new era, new forms, new tools and new methods, improves students' interest in attending classes and reading textbooks in the Internet era, but also helps teachers imperceptibly implement innovative teaching reform ideas, and fully embodies the characteristics of information teaching reform in the new era.

(4) It has a wide range of reference value

All computer-related majors in colleges and universities at home and abroad offer discrete mathematics courses with different course natures, and discrete mathematics is also one of the major courses in many domestic postgraduate examinations. It can be seen that the research results of this project can not only be used for the professional basic courses of computer-related majors, but also can be used as a reference for graduate students and other students, teachers and professionals.

2) Expected effect

At the same time, the project team will also comprehensively sort out and summarize the experience of teaching reform, write and publish high-level papers, and compile high-level teaching materials, so that the results of the project can be more widely promoted and applied.

V. Scope of implementation and promotion value

1) Scope of implementation

The teaching reform carried out by this project will be piloted among the students of Taishan University majoring in Information and Computing Science, Mathematical Science and Big Data Technology, and Mathematics (Normal), and after successful experience, it can be gradually implemented in related majors in the whole university.

2) Promote the value of the application

The research results of this project can be promoted in other universities and related majors, and the benefits will be expanded, with strong promotion and application value, strong practical significance and operability.

VI. Summary

In summary, with the continuous deepening reform of national education, the content of textbooks can gradually not match education, so it is urgent to compile new textbooks, but in the process of compiling textbooks, we should pay attention to whether they match with actual teaching, do a good job of research in advance, and comprehensively consider the impact of all aspects on textbooks, so as to effectively show the role of integrated media textbooks in today's situation and effectively improve the teaching quality and teaching level of higher education.

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