

Research on the Construction of Case Library for Master of Education Curriculum—Taking “Research on Middle School Mathematics Curriculum and Textbooks” as an Example

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Abstract: Case teaching is an effective way to improve the teaching quality of Master of Education courses. On the basis of elaborating on the problems in the construction of the case library for the Master of Education course, the article analyzes the necessity of constructing the case library for the Master of Education course. Taking “Research on Middle School Mathematics Curriculum and Textbooks” as an example, this paper explores the construction content of a case library. Finally, suggestions for the construction of an education master’s course case library are proposed from the aspects of case content selection, institutional guarantee, funding guarantee, and teacher training.

Keywords: Case teaching; Case library; Research on Middle School Mathematics Curriculum and Textbooks

1. Introduction

The training goal of Master of Education is to cultivate high-level, application-oriented specialized talents with a solid theoretical foundation in education, proficient mastery of educational scientific research methods, and strong practical abilities in education and teaching, capable of competent basic education teaching and school education management work. This target positioning highlights practicality and applicability. Currently, the cultivation of education master’s degree in China faces many challenges, such as unclear talent cultivation goals, unreasonable curriculum system, and imperfect case teaching models^[1]. One of the strategies to address these challenges is to strengthen the construction of the case library for the Master of Education curriculum, which helps the Master of Education combine theoretical knowledge with practical educational contexts, thereby enhancing their learning interest and practical abilities.

2. Problems in the construction of the case library for Master of Education courses

The construction of a case library for master’s education courses is an important guarantee for improving teaching quality. In the practice of case teaching, we have found that there are some problems in the construction of the case library for the Master of Education course, which are specifically reflected in the following aspects.

2.1 The case library has low case quality and lacks practicality

The quality of existing teaching case libraries varies, and some cases may lack rigorous data support, logical analysis, or practical experience, resulting in limited teaching value. Low quality cases not only fail to effectively help students improve their practical abilities, but may also affect their professional understanding of education. Many cases in the case library are too theoretical or abstract, lacking close connection with the actual teaching environment. This makes it difficult for students to translate the knowledge in the case into effective solutions when facing real educational problems.

2.2 The update of the case library is lagging behind, lacking timeliness and an international perspective

The purpose of constructing a case library is to serve case teaching, constantly updating and improving in practice, enriching new cases, and adapting them to the needs of new situations. At present, due to the lack of necessary management and maintenance during the development process of the case library for Master of Education courses, the content of the case library is often outdated, updated slowly, and not updated in a timely manner. The practical models and concepts in the field of education are constantly evolving and updating, but the current update speed of case libraries is far behind this change. Outdated cases cannot reflect the latest trends in education and may even mislead students, making it difficult for them to adapt to the real educational environment. On the other hand, in the context of globalization, the practice and challenges in the field of education also have internationalization characteristics. However, some cases are mainly concentrated in China, lacking attention and comparison to international educational practices. This results in insufficient exercise of students' abilities in international perspectives and cross-cultural education.

2.3 Insufficient number and variety of cases in the case library

The number of cases in the Master of Education teaching case library is relatively small, and a systematic case library resource library has not been formed, which cannot meet the diverse learning needs of students and limits their understanding and exploration of different educational contexts and problems. In the field of education, there are various teaching scenarios, subject areas, and educational objects, and the existing case library only covers a part of them, lacking attention to other important fields.

In view of the above issues, in order to better serve the training objectives of the Master of Education, the construction of the Master of Education course case library should be guided by certain educational concepts, revolve around specific teaching objectives, follow certain principles, and write scientific, systematic, and practical case tutorials and materials based on thorough investigation, research, and careful summary of practical experience.

3. Content of Case Library Construction for the Master of Education Course “Research on Middle School Mathematics Curriculum and Textbooks”

This project is based on the principles of “authenticity, typicality, pertinence, and comprehensiveness”. It aims to construct more than 10 high-quality teaching cases for the teaching content of middle school mathematics algebra, geometry, statistics and probability, calculus, and other content analysis chapters, so that the Master of Education can analyze and design middle school mathematics courses and textbooks, Master the necessary educational and teaching practice and research abilities for engaging in middle school mathematics education and teaching research. Students can engage in in-depth discussions on cases through group collaboration, collect information, design teaching materials, form teaching design analysis reports or papers, and present their results in the form of defense, in order to achieve integration and flexible application of teaching content. The application of case library in this course will help Master of Education master master practical and highly professional teaching design skills to conduct teaching research, and provide assistance for Master of Education master to further deepen their study of mathematics education reform research, mathematical thinking and methods research, middle school mathematics teaching design and implementation research, and other courses.

The case content mainly combines the latest development and research hotspots of mathematics education. In the context of the new curriculum reform, teaching design research is carried out for various theme contents of middle school mathematics, including the introduction of mathematics education theory, teaching strategies, teaching design principles, teaching design (textbook analysis, learning situation analysis, teaching objectives, teaching key and difficult points, teaching methods and means, teaching process design, teaching process), teaching design analysis, etc. For example:

Case 1: A Case Study on Vector Themes

Vector is an important component of modern mathematics, serving as a bridge between geometry and algebra, and a means of expressing the real world. In high school mathematics, the importance of plane vectors is increasingly prominent. Therefore, in teaching, it is important to pay attention to using

vectors to train students in thinking, in order to improve their understanding of mathematics. APOS theory is a process theory about concept learning based on the characteristics of mathematical disciplines. Through the research on the teaching design of high school mathematics concept courses based on APOS theory - using plane vectors as an example, the Master of Education will apply APOS theory to the specific implementation characteristics of high school mathematics concept courses, explore the feasibility and necessity of applying APOS theory in high school mathematics concept courses, establish teaching concepts and principles of teaching design, and master how to apply APOS theory to guide the teaching design of high school concept courses.

Case 2: A case study on the theme of conic curves

The knowledge of conic curves in high school is abstract and difficult. Integrating STEAM education concepts into conic curve teaching can help students better understand, comprehend, and apply mathematical knowledge, stimulate their interest in learning mathematics, and enhance their comprehensive abilities. STEAM education is a comprehensive education that combines multiple disciplines such as science, technology, engineering, art, mathematics, etc. It is related to practical situations, problem oriented, breaks down the boundaries between disciplines, focuses on comprehensive practical activities, and cultivates well-rounded talents required by the new era. Through the study of the case “Research on Teaching Design of High School Mathematics Conic Curve Based on STEAM Education Concept”, the Master of Education will master how to construct a suitable STEAM mathematics classroom teaching process based on China’s academic situation, high school mathematics curriculum standards, and People’s Education A-version textbooks. Under the guidance of relevant theories and principles, the knowledge of conic curve will be integrated with STEAM education concept. The integration of STEAM education philosophy into mathematics classrooms can provide new teaching design ideas for Master of Education, changing the traditional teaching mode of simply inputting and outputting mathematical knowledge. It can also promote the professional development of education master’s teachers and provide a qualitative improvement in their classroom teaching level^[2].

Case 3: A Case Study on the Teaching of Problem Chains in Junior High School Mathematics

In order to comprehensively deepen curriculum reform and implement the fundamental task of cultivating morality and talent, “problem chain” teaching has become a widely used teaching method in middle school mathematics classrooms. This case is based on the research of teaching design for middle school mathematics problem chain based on deep learning, and is based on the theoretical foundation of deep learning. Through this case study, the Master of Education can master the concepts of deep learning and problem chain teaching, understand the current situation of problem chain teaching, and learn how to propose deep learning based teaching design strategies for middle school mathematics problem chains in response to the problems in current problem chain design. Based on the design strategy, case analysis and presentation will be conducted to provide reference and guidance for the application of problem chain teaching in teaching practice for education masters. This case can help the Master of Education to better identify problems in teaching and conduct further thinking and communication, which helps to improve the professional competence, reflective ability, and collaborative communication ability of the Master of Education.

Case 4: A case study on solving situational problems in mathematics teaching

In the 2017 edition of the Curriculum Standards for Mathematics in Ordinary High Schools issued by our country, the six core competencies of mathematics are clearly proposed, and problem solving, the connection between mathematics and life, and other disciplines are emphasized. Suitable teaching scenarios are created to grasp the essence of mathematics content. The new high school curriculum standard requires “to structure the curriculum content, take the theme as the guide, contextualize the curriculum content, and promote the implementation of core competencies in the subject”. Therefore, studying the theme based teaching design of high school mathematics in specific contexts is a powerful driving force to solve the above situation. Through the study of the case study “Research on the Teaching Design of Financial Situational Problems in High School Mathematics New Textbook”, the Master of Education will master the connotation of situational problem teaching, the characteristics and models of situational problem teaching design, and design teaching plans for homework, classroom, expansion topics, and mathematical modeling activities in daily life situations. Cross chapter thematic teaching can connect progressive knowledge points in the mathematical knowledge system, which is more conducive to the integration of knowledge by educational masters. This case is based on the edition of high school mathematics textbooks and provides a comprehensive teaching design case for mathematics teaching of financial situational problems. It provides a reference for Master of Education

to carry out financial situational infiltration teaching, overall teaching, and interdisciplinary practical teaching.

Case 5: A case study on the design of mathematical unit teaching

With the new mathematics curriculum reform proposing to cultivate students' core competencies, frontline mathematics teachers are beginning to consider how to implement core competencies in the classroom. The unit teaching design grasps mathematical content as a whole, plans teaching in a coordinated manner, and is conducive to cultivating students' core competencies. The UbD (Understanding by Design) theory emphasizes that teaching should enable students to transfer knowledge on the basis of understanding the knowledge points, and learn to apply theoretical knowledge to solve practical problems, providing a strong theoretical basis for unit teaching design. Through the study of the case "High School Mathematics Unit Teaching Design Based on UbD Theory - Taking Set and Common Logic Terms as an Example", the Master of Education will clarify the principles of unit teaching design based on UbD theory, construct a unit teaching design program based on UbD theory according to the process of unit teaching design, the three stages of UbD teaching design, and the current situation of mathematics teaching. Finally, using "Set and Common Logic Terms" as an example, master how to design unit and lesson teaching. In order to help students better understand knowledge, build a complete knowledge system, and cultivate mathematical core competencies, this case uses UbD theory as the framework for mathematical unit teaching design, and combines the characteristics of mathematics to design the unit teaching of "sets and common logical terms", providing reference for the unit teaching of Master of Education^[3].

4. Suggestion

The selection of content for the Master of Education case library should be based on the training objectives of the Master of Education, focusing on practical issues in education, with strong pertinence, practicality, and operability^[4]. We should choose cases that can reflect the actual problems encountered in the school and educational teaching practice, and reflect the practical behavior of the school and teachers from multiple aspects such as educational management, teacher management, student management, curriculum design, etc. In terms of content selection, real-life problems should be taken as the main body of the case, which has a certain universality. At the same time, the content of the case library should be based on practical problems and reflect the new problems that have emerged in the current education and teaching reform, such as curriculum and teaching reform, and student evaluation method reform. Only in this way can we better serve the teaching practice of Master of Education and solve the current problems in education and teaching.

The construction and use of a case library is a systematic project that requires starting from multiple aspects such as system, funding, and teaching staff^[5]. The school should establish a complete case resource management system, including rules and regulations for case selection, writing, editing, use, and updating, to ensure that the construction and use of the case library are standardized and orderly. The school aims to enhance the understanding of case teaching among teachers, cultivate their ability to write case teaching courseware, and fully leverage the leading role of students in the construction of case resources. The national and local governments also need to provide appropriate support for the construction of case libraries. Only in this way can the quality of the case library for graduate courses in the field of education master's degree be further improved.

5. Conclusion

On the basis of elaborating on the problems in the construction of the case library for the Master of Education course, the article analyzes the necessity of constructing the case library for the Master of Education course. Taking "Research on Middle School Mathematics Curriculum and Textbooks" as an example, this paper explores the construction content of a case library. Finally, the paper puts forward some suggestions on the construction of the case library for the master of education from the aspects of the selection of the case content, the system guarantee, the financial guarantee, the training of the teaching staff and so on.

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