

Reform Research about High School Mathematics Curriculum Standards and Analysis on Teaching Materials

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Abstract: *Under the background of Normal Professional Certification, We will start a series of teaching revolutions about a curriculum named high school mathematics curriculum standards and analysis on teaching materials based on concepts “students-centered, output oriented, consistent improvement”. The passages will clarify the new concept of curriculum teaching revolution from various aspects like the background of teaching revolution, the mode of teaching, the cultivation of teacher’s morality, the education of ideological and political work, and the methods of assessment. Improving teaching effectiveness through teaching reform and promoting the comprehensive cultivation of teacher training students’ abilities can achieve the goal of effectively.*

Keywords: *Curriculum Standards, Teaching Methods, Assessment Methods*

1. Introduction

On January 25th, 2018, Ministry of Education of the People’s Republic of China held a web video conferencing on the work of professional certification of normal colleges and universities and deployed the work of certification of normal major. The aim of the conference is to rebuild the education system, improve the quality and lay a solid foundation for teacher education and training first-class teachers by treating the certification of normal major as a breakthrough.

“Measures for the implementation of professional certification in normal colleges and universities (provisional)” emphasized that “The quality of the training of teacher-training majors should be evaluated according to the learning effects of the students and the requirements of the core competence of the graduates; the teaching of teacher-training majors should be evaluated in an all-round way and in the whole process, so as to promote the continuous improvement of the quality of the training of teacher-training majors.” The development of the accreditation of teacher-training majors provides new ideas and directions for the teaching reform of various courses of teacher-training majors, promoting the enthusiasm of teachers’ teaching and research work. The development of teacher professional certification has provided a new direction for the teaching reform of various courses in teacher training majors, and promoted the enthusiasm of teachers in teaching and research.

The mathematics curriculum standard and analysis on teaching materials is one of the suggested modules in the curriculum standard of teacher education (trial implementation) and the curriculum setting of pre-service teacher education in high school. This curriculum is not only a basic course for high school mathematics education, but also a basic curriculum for improving the teaching skills of mathematics education. For the students of Mathematics Normal School, they should not only be familiar with the background and trend of the reform of high school mathematics curriculum, but also understand the basic ideas and implementation methods of high school mathematics curriculum, familiar with the basic context of teaching materials and basic content^[1], but also learn to analyze the mathematics curriculum standards and mathematics teaching materials ability and methods, the transformation from "grasping the knowledge" to "knowing how to grasping the knowledge" and "applying" knowledge, so as to lay a solid foundation for the sustainable development of the major and the teaching of mathematics in the future^[2-4]. With the opportunity of teacher education professional certification and the aim of cultivating students' comprehensive ability, the teaching reform of the course has been explored in our college. Hope it can provide reference for other kinds of education reform work featured in educational curriculum.

2. The teaching reform measures in high school curriculum standard under professional normal school recognition

For mathematics teacher training students, through the study of this course, they can be familiar with the background and trend of curriculum reform in the basic education stage, understand the basic concepts and implementation methods of secondary mathematics courses, and be familiar with the basic context and basic content of teaching materials [1]., improve the ability to analyze, understand and apply teaching materials, and lay a solid foundation for successfully engaging in the education and teaching of mathematics courses. Taking the teacher professional certification as an opportunity, re-examining the teaching content, teaching methods and assessment methods of this course, and carrying out teaching reform with the goal of cultivating students' future teaching ability, it is of great benefit to the improvement of students' future professional skills.

2.1 Guided by teaching objectives, improve the syllabus and optimize the course content

In line with the principle of closely following professional certification standards, supporting graduation requirements, and cultivating qualified teachers, we actively reform and improve the curriculum content system, deeply interpret the connotation and spirit of secondary school mathematics curriculum standards, re-examine and revise the syllabus, and improve the teaching plan.

The establishment of teaching objectives is the core content of the syllabus. The curriculum objectives of the secondary mathematics curriculum standards are established to cultivate students' ideals, beliefs, value orientations, political beliefs and social responsibility educational feelings, as well as the spirit of learning-centered group cooperation, by exploring the ideological and political elements and typical teaching cases contained in the professional knowledge content of the curriculum, so as to encourage all students to actively participate in the analysis and processing of practical application cases, stimulate students' interest in learning, and enhance their learning confidence and sense of achievement. Specifically, the following three teaching objectives are formulated:

The first teaching objective is to understand the basic structure of the secondary mathematics knowledge system and the requirements of the new curriculum standard for each part of the teaching content, and understand the basic mathematics teaching theory.

The second teaching objective is to master the principles and key points of teaching design, learn the analysis methods of teaching materials, initially have the ability of mathematics teaching design, and be able to make preliminary analysis and evaluation of teaching cases according to curriculum standards.

The third teaching objective is to cultivate students' correct world view, outlook on life, values and professional identity; To cultivate students' reflective spirit and cooperative learning ability.

The three teaching objectives correspond to the learning to teach in the graduation requirements, teaching ability objectives: understand the concept of secondary mathematics curriculum standards and the basic ideas of the preparation of secondary mathematics textbooks, learn the analysis methods of teaching materials and learning situations, be able to formulate appropriate teaching objectives according to students' cognitive characteristics, select appropriate teaching methods, and have the ability to design mathematics teaching; Master modern education information technology, proficient in using mathematics teaching software to organize teaching, gain experience through teaching practice, and have preliminary teaching evaluation and teaching research capabilities. Learn to develop, communication and cooperation ability goals: have certain social communication skills, master communication and cooperation skills and methods, be able to communicate with team members, cooperative learning and collaborative mutual assistance. According to the set teaching objectives, reform teaching methods and improve the effectiveness of classroom teaching.

The study of the course standard is inseparable from the mathematics textbook, the course standard is the skeleton, the textbook is flesh and blood, and the combination of the two can form an organism^[2]. In addition to the interpretation of the "Compulsory Education Middle School Mathematics Curriculum Standards" and "High School Mathematics Curriculum Standards" issued by the Ministry of Education, the teaching content of this course should also be combined with the analysis of secondary mathematics related textbooks. Considering the textbook requirements of the Provincial Teaching Skills Competition, we mainly refer to the Qingdao version of the compulsory education mathematics textbook and the people's teaching version of the high school mathematics textbook as supporting textbooks in the teaching process. While interpreting the curriculum standards, we also study the cases in the textbook.

2.2 Optimize teaching mode. Cultivate students' exploring ability and analyzing ability

Reform Research about High School Mathematics Curriculum Standards and Analysis on Teaching Materials is a curriculum focusing on both theory and practice, where teachers not only should pay attention to the teaching of theoretical knowledge but also the practice of the ideas and methods students have when analyzing textbooks. It can improve theoretical level and meanwhile cultivating students' ability of applying theoretical knowledge, analyzing independently and solving problems, so as to enhance students' teaching level.

In the context of professional certification, it is recommended to reform the original lecture-based teaching mode of "teachers speaking, students listening, emphasizing theory, and emphasizing practice" to a participatory teaching mode. Common participatory teaching activities in this course include: "course structure and content block diagram representation", "case study of teaching materials", etc. [2]. Students actively participate in teaching activities, realize knowledge construction through group cooperation and communication, and cultivate students' independent analysis ability of teaching materials.

2.2.1 "Activity-Participation" teaching mode. Push students to think actively and cultivate students' cooperative spirit.

The former teaching mode of "Teachers talk, students listen" has been changed into "Activity-participation" teaching mode. Common participatory teaching activities include: "Case Study of teaching materials", "Teaching design and content display" and so on. Encourage students to actively participate in teaching activities, construct the knowledge system through group cooperation and exchange and cultivate students' self-analyzing ability.

Study the teaching objectives and the related mathematical content in groups, and design the discussion topics carefully for each class. Call on students to discuss problems on class or after class, and encourage students to exchange their real thoughts on the subject in time, deepen and absorb knowledge in the exchange and sharing. Design for presentation of discussion results or teaching clips in class, in small groups, selectively. This section can let students participate in the activities set up, enhance students' interest in learning, and students can take the initiative to think. Students can accumulate analysis of mathematics curriculum standards and teaching materials methods and experience by exchange and sharing. The results show that more than 90% of the students can analyze and design the teaching contents independently and completely through one semester of study and training, and the process of participating in activities can also enable students to experience the necessity of collective teaching and research in middle schools, cultivating students' consciousness and habit of collective teaching and research, and understanding the significance of teamwork. At the same time, the change of teaching mode is also helpful to cultivate students' mathematics teacher quality.

2.2.2 Watch teaching case videos to improve students' ability to analyze and design teaching materials through reflection

Through the interpretation of the curriculum standards, students will understand the teaching objectives of each unit. For the problems of how to achieve teaching goals in the teaching process and what kind of teaching design is a good design, we adopt a comparative reflection method to let students intuitively feel from the perspective of teachers. To this end, we insist on updating the resource library, collecting and organizing excellent teaching video materials, and various award-winning teaching cases. Some non-award-winning instructional videos are also prepared. For the same teaching content, show excellent videos and general videos to students, let students compare which teaching video is better after watching, and set up questions to discuss in advance: How are the requirements of the curriculum standards reflected in the lesson examples shown in the video? What are the advantages of lesson design? What are the shortcomings of the lesson design? If you were asked to do it, how would you design it? Throughout the classroom, teachers have something to learn in terms of classroom control, teaching style, language, etc. Through the discussion, students will experience the process of rational analysis from intuitive to rational analysis, realize what kind of instructional design is good instructional design, what kind of class is a good class, and how to make the class more dynamic and efficient, and then reflect on and revise their own design. This process of analysis and reflection can not only cultivate students' ability to analyze and grasp teaching materials, improve teaching design ability, but also enable students to feel the charm of teaching.

2.2.3 Strengthen the ability of teaching practices and improve teaching skills

At present, it is general that the education courses of colleges and university is facing a problem --- the insufficient educational practice class time, and the curriculum focuses on theoretical learning

therefore ignores the specific educational practice needs of teacher students. Hence, in the teaching of this course, it is necessary to provide students with more teaching practice opportunities, design and think about secondary mathematics teaching cases and methods, including but not limited to explaining teaching content fragments, explaining topics, explaining course design ideas, etc. in the classroom, and integrating teacher skills training into daily learning^[5]; Encourage students to actively participate in teacher practice skills competitions, so that students can deeply understand and appreciate the connotation of secondary mathematics curriculum standards in teaching practice and exercise, and cultivate teacher training students to master teaching methods such as discussion, questioning, situation, and inquiry in practice, so as to improve their teaching level^[6-7].

2.2.4 Strengthen exchanges and cooperation among teachers in the same line of high schools, deepen the unified results of theory and practice, and realize cooperative education.

In order to enable students to better understand the current situation of high school teaching and teaching reform, we have hired local mathematics teaching researchers and excellent front-line teachers as part-time teachers, and invited them to enter the classroom from time to time to make teaching and research reports, so that students can timely grasp the latest developments in front-line teaching and research, combine theory and practice to understand how the theory in books is practiced in the classroom, avoid the disconnect between theory and practice, and be able to adapt to teaching and research work faster after graduation. In addition, in our skills training activities, the participation of front-line teachers in high schools has greatly helped students in curriculum organization design and teaching skills improvement, and the effect is tremendous. Our school has achieved excellent results in the provincial normal student teaching skills competition in previous years, which is a concrete embodiment of the results of cooperation between universities and middle schools.

2.3 Infiltrate Ideological and political education in teaching, focus on teacher moral cultivation education, cultivate a sense of professional identity, stimulate learning motivation

"Only by loving can we persevere". The fundamental purpose of teacher education is to cultivate excellent basic education forces for society and reserve talents for education. There is a drawback in the current teacher education---emphasizing academics and light teachers, which is particularly prominent in comprehensive colleges: only pay attention to the study of academic professional courses, but ignore the particularity of teacher education. In addition to the lack of practical skills training, what is more worthy of attention is the lack of some characteristics of teacher training for teacher students, such as teacher morality and teacher style cultivation education, professional identity training, education sentiment cultivation, etc. As an important teacher education course, the analysis of high school mathematics curriculum standards and teaching materials should aim at cultivating virtue and cultivating people in the process of curriculum design, combining knowledge transmission with education, implementing the whole process of education, and integrating teacher moral cultivation and ideological and political education. Our school has always maintained good communication with outstanding alumni, and there are also a large number of lecture videos of outstanding alumni in the course resource library, through watching alumni lecture videos, alumni testimonials and other forms to enhance students' sense of professional identity and stimulate students' learning motivation. Another example is to organically combine the cultivation of teachers' morality and the cultivation of national spirit with the cultivation of patriotic feelings. Through reading biographies of educational celebrities, inviting experts and scholars to give special reports, etc., students are inspired to look at education from the national and ethnic levels, and realize cultural education.

2.4 Improve assessment methods and diversify course evaluation

Teacher professional certification requires "guided by the learning effect of normal students", and conducts all-round and whole-process evaluation of teaching work. Based on this, in the teaching evaluation of this course, we also adhere to the principle of strengthening process evaluation and downplaying final evaluation, and give a comprehensive, objective and fair evaluation of students' learning performance and learning effect. We have divided the overall grade composition of the course into four parts: the first part is the student's usual classroom achievements. In the group-based seminars, the results of the group members are given according to the overall performance of the group and the quality of the results; The second part is an irregular short essay score, and the score is given according to the quality of the paper; The third part is the students' usual lecture training results; The fourth part is the examination of theoretical knowledge at the end of the course. The four-part assessment content covers the whole process of student learning in terms of time, and covers all aspects of student ability

development. Facts have also proved that diversified evaluation methods can stimulate students' interest in learning, effectively deepen students' understanding of secondary mathematics textbooks, improve students' ability to analyze textbooks and curriculum design, and are of great significance for students to carry out teaching and research work faster after future work.

3. Conclusions

High School Mathematics Curriculum Standards and Analysis on Teaching Materials is a pre-professional guidance course for normal students, and it is one of the important teacher education courses, which is of great significance for students to have an in-depth understanding of secondary mathematics teaching and improve professional skills. Teachers should effectively implement the professional certification concept of "student-centered, output-oriented, and continuous improvement" in teaching, and spend more effort to improve teaching methods and means, so that students are willing to learn, love learning, truly harvest knowledge, cultivate ability, feel the charm of teaching, and have a sense of identity and pride in the teaching profession. Only in this way can the teaching objectives of this course be achieved. As teachers engaged in the teaching of this course, we should take the teacher certification as an opportunity to actively explore curriculum teaching reform, and make our own contributions to cultivating new middle school mathematics teachers who can undertake the task of secondary mathematics reform and sustainable development^[8].

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