Research on the Reverse Teaching Design of Mathematics in Secondary Vocational Schools Focusing on Core Literacy

Yan Wang
Jiangsu Union Technical Institute Zhenjiang Branch, Zhenjiang 212000, China.

Abstract: The six core competencies of mathematics in vocational schools are becoming increasingly important in mathematics learning. The reverse teaching design of vocational school mathematics, which focuses on core competencies, precisely grasps the internal logic of knowledge from a holistic perspective, and designs it on a unit by unit basis. The design process is to infer the starting point from the endpoint. Therefore, how to use reverse thinking in teaching design research in vocational school mathematics teaching under the background of core competencies will be the main content of this article.

Keywords: Core Literacy; Vocational Mathematics; Reverse Teaching Design

1. Introduction

In recent years, traditional mathematics teaching design has been based on teaching objectives, designing corresponding teaching activities, and evaluating the mastery of mathematics classroom content through in-class and extracurricular testing or homework. This has severed the connection between knowledge and is not conducive to students summarizing current and future knowledge. Teachers have found that combining core mathematical literacy elements in mathematics teaching to reverse design classroom teaching content is beneficial for promoting the overall efficiency of classroom teaching.

2. The purpose of the research on the reverse teaching design of mathematics in vocational schools that focuses on core competencies

The research on secondary vocational mathematics that focuses on core competencies is a major aspect of studying mathematics classroom teaching from the perspective of innovative vocational education, which is beneficial for enriching theoretical research related to reverse teaching design. Cultivating students' core competencies and sustainable development abilities has become the goal of educational reform, and is also a major exploration direction in current vocational education classroom teaching research. Therefore, it is necessary to recognize and understand the current situation of reverse teaching in vocational school mathematics with targeted core competencies and teachers' instructional design abilities. Combining reverse instructional design theory to conceive the cultivation and research of targeted students' mathematical core competencies will be the main purpose of this article, which is of great significance for promoting the enrichment and development of mathematical reverse thinking theory.

3. Current situation of mathematics teaching classroom in vocational schools

3.1 Teaching design is too simple, lacking thinking and innovation

Due to the weak mathematical foundation of vocational school students and the severe compression of mathematics class hours as a public basic course, many vocational school mathematics teachers interpret mathematical knowledge relatively simply and roughly. After investigation, most vocational school mathematics teachers have reported that there is a phenomenon of teaching according to textbooks in vocational school mathematics classrooms, and teachers feel that innovation and learning are not necessary. So many teachers do not design teaching content based on the combination of teaching content and students' learning situation, nor do they conduct research and reconstruction of the learned content, lacking a full understanding of the learning situation, which leads to the

inability to effectively improve students' learning ability and awareness habits.

3.2 Lack of overall planning and design in classroom teaching, especially unit based design

In the current mathematics classroom teaching of vocational schools, it can be found that teachers lack effective planning for the teaching classroom, and students are unable to grasp the key and core points of mathematical block content, resulting in generally low mathematical cognitive awareness and logical thinking abilities of students, and poor understanding and mastery of mathematical knowledge. In the entire classroom teaching, teachers lack in-depth research and analysis of the knowledge of the entire unit to be learned, cannot clarify the context, and cannot identify internal logical relationships. After fully understanding the students' situation, they can accurately judge the students' learning outcomes, problems that may arise, and abilities that need to be acquired, thus making a comprehensive planning and design of the teaching content. Some teachers always habitually design teaching according to their own thinking, and make students form fragmentation knowledge points, which is difficult to form a knowledge network. Naturally, they need to repeatedly explain to deepen memory.

3.3 Lack of precision and logic in designing 'problems'

Asking questions in the classroom is an art, and the design of each question is carefully prepared by the teacher. It is based on the teacher's comprehensive analysis of the key, difficult, and logical structures of the knowledge learned, and is designed to guide students to actively think, in order to promote students to digest and understand key knowledge, and achieve hierarchical and gradient solutions to difficult knowledge. However, vocational school mathematics teachers often use simple questions when asking questions, lacking in-depth thinking and diverse questions.

4. The significance of reverse teaching design for middle school mathematics towards core competencies

4.1 Beneficial for enriching theoretical research on reverse instructional design

Reverse design advocates that teaching design should first clarify the learning objectives, then determine which evaluation evidence can indicate that the objectives have been achieved, and finally determine the teaching content and methods based on the former. It is a teaching design that starts with the end. Reverse instructional design is a big concept, which should have different characteristics for different disciplines, different stages, and different learning contents. Research on reverse instructional design in middle school mathematics, which focuses on core competencies, can provide case studies and theoretical supplements to the entire research on reverse instructional design, thus allowing the entire classroom instructional design theory to develop in a deeper direction.

4.2 Promoting the transformation of classroom teaching thinking towards core competencies among vocational school mathematics teachers

In the current process of vocational mathematics teaching, teachers have neglected the reform and transformation of students' classroom teaching thinking, and have implemented the reverse teaching design of middle school mathematics that focuses on core competencies into vocational mathematics teaching. This can effectively guide teachers to start with teaching design and development from the expected results, thereby promoting the improvement of students' professional cognitive literacy ability and awareness, in order to guide students to think and explore the mathematical knowledge they have learned more widely and deeply, so that teachers can analyze and grasp the entire process of teaching and explaining individual knowledge, reconstruct knowledge, and promote thinking transformation.

4.3 Improving teachers' classroom teaching design ability

Reverse teaching design breaks through teachers' understanding of the original classroom teaching. Originally, teachers only needed to design the teaching content simply, introduce some life or professional examples appropriately, explain typical examples, and consolidate the knowledge points learned through in class and out of class exercises, neglecting the cultivation of students' abilities and thinking. Nowadays, reverse teaching design requires planning the entire unit of knowledge. Learning is divided into several stages. When designing teaching, teachers need to make predictions about the time spent and the expected results achieved. The

designed activities and questions will be used to verify the results and evidence, and students' initiative and research-oriented learning should also be considered. What task can students fully explore the results and in what form can the activity be presented? How long does it take? What kind of abilities are being tested for students? What kind of stories or examples are students interested in? This is a major test for teachers' classroom design ability. Teachers need to constantly learn and practice, and in the long run, it will greatly improve their classroom design ability.

5. Design strategies for reverse teaching of mathematics in vocational schools with a focus on core literacy

5.1 Promoting the improvement of students' mathematical logical thinking awareness based on the reverse teaching process of mathematics in vocational schools

The expected learning outcomes of teachers are defined in the curriculum standards as the acquisition of knowledge, skills, and emotions, and can be applied and transferred based on deep understanding, ultimately helping students acquire corresponding core competencies. Based on this, teachers design and effectively carry out teaching activities to enable students to enhance their cognitive awareness and ability through in-depth understanding and analysis of mathematical knowledge, and promote the improvement of students' mathematical logical thinking ability.

5.2 Guiding students to engage in mathematical modeling and imagination through real-life examples, experiments, etc., enhancing their cognitive and hands-on abilities, and transferring and applying what they have learned to solve practical problems

Secondary vocational school students, due to their weak mathematical foundation, rarely have teachers allow them to hands-on solve practical problems. In fact, mathematics comes from daily life. If teachers introduce real-life cases to guide students in mathematical modeling and imagination, and discuss and understand based on the constructed model, it can better stimulate students' learning initiative and interest.

5.3 Arranging and organizing corresponding mathematical learning and practical activities to enhance students' ability to apply knowledge

The ability to apply and transfer mathematical knowledge is a manifestation of core competencies. Arranging and organizing corresponding mathematical practice activities can effectively guide students to apply the knowledge they have learned, which is an extension of understanding. Research has shown that mathematical experiments and practical activities are very effective in cultivating core competencies, enabling students to rapidly improve their mathematical core competencies.

6. Conclusion

In summary, in the process of carrying out mathematics teaching in vocational schools, teachers should fully understand students' learning and cognitive needs, pay attention to combining life examples to guide students in teaching and guiding corresponding knowledge, enable students to fully interpret it, and construct and imagine mathematical models based on their own cognition, in order to promote students' application of knowledge, and truly improve core literacy.

References

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