10.18686/ahe.v6i21.6697

An Analysis of the Use of Hierarchical Teaching Methods in Teaching Mathematics in Vocational Colleges

Meihua Cui
Leshan Normal University Sichuan Leshan 614000,China

Abstract: Modern education and teaching stress the subjectivity of students and formulate corresponding teaching strategies to improve students' comprehensive ability from their actual situation. Among them, the hierarchical teaching method can effectively improve the quality and efficiency of higher mathematics teaching and strengthen students' mathematical learning ability. Based on this, this paper proposes the application method of hierarchical teaching strategy in higher mathematics teaching and addresses the problems on the basis of the meaning and principles of hierarchical teaching.
Keywords: Advanced mathematics; Hierarchical teaching; Application methods

Mathematics plays an important place in the higher education curriculum, which can improve students' logical thinking skills and enable them to develop rigorous behavioral habits, as well as enhance their spirit of scientific inquiry and promote their future development. In the education system of vocational colleges, higher mathematics is an important part of many majors. However, students differ greatly in various aspects such as learning ability, background, and attitude. Therefore, the implementation of hierarchical teaching is worthwhile.

1. Exploration of hierarchical teaching model

In mathematics education of higher vocational colleges, hierarchical teaching should be strengthened to realize "teach students in accordance with their aptitude". Specifically, the representation of the hierarchical teaching model is as follows:

1.1 Hierarchization of students

Hierarchical teaching must first hierarchize students, which is fundamental to the implementation of hierarchical teaching and the key to its practical application. Specifically, instead of hierarchizing students according to their grades, students must be considered comprehensively as a whole, such as learning ability, classroom performance, and learning attitude, so that teaching can be conducted in a more scientific and rational manner.

1.2 Hierarchization of teaching content

Hierarchical teaching is also reflected in the content of instruction. First, basic knowledge, such as basic mathematical concepts, equations and other relatively simple basics; second, advanced knowledge, on the basis of basic knowledge, to strengthen mathematical thinking.

1.3 Hierarchization of the teaching process

The hierarchical teaching mode is also reflected in a clear division of the teaching process, which is due to the fact that with hierarchical teaching, students' levels and teaching contents are all greatly different, and if the same teaching process is adopted, it will have a great impact on the quality of teaching.

1.4 Precautions for hierarchical teaching model

In the process of implementing hierarchical teaching, teachers should adjust students' hierarchization according to the teaching process and effects, at least once each semester; teachers should maintain the same seriousness and responsibility for students of different levels in the teaching process, strengthen communication and exchange with students, and create a good teaching environment so that students' interest in learning mathematics and academic performance can be improved.

2. The role and significance of hierarchical teaching model in higher education mathematics

Hierarchical teaching has a very important significance in higher education, which is manifested in the following ways:

First, in mathematics education in vocational colleges, hierarchical teaching can meet the needs of students at different levels while making the best use of teaching resources.

Second, in mathematics education in vocational colleges, hierarchical teaching can make students more clearly understand their own position and define their own goals.

Third, in mathematics education of vocational colleges, hierarchical teaching can provide a good learning environment for students of different levels. Students with good foundation and strong comprehension can improve their learning under higher learning pressure, while students with weaker foundation can find confidence in learning and keep improving their learning level through hierarchical teaching.

Fourth, in mathematics education of vocational colleges, hierarchical teaching can also enhance students' sense of competition and make them progress in the competition.

Fifth, in mathematics education of vocational colleges, hierarchical teaching can not only promote the improvement of students' learning ability, but also test teachers' teaching ability, thus improving their teaching level.[1]

3. The shortcomings of current teaching mathematics at vocational colleges

3.1 At present, vocational colleges in China allocate relatively little class time for mathematics classes

At present, the teaching goal of China's higher vocational colleges is mostly to cultivate highly skilled technicians. As a result, higher vocational education tends to focus more on practical courses in specific teaching sessions, arranging a large number of class hours for training of various professional skills, while greatly shortening the teaching time of basic knowledge. In terms of teaching, as the number of courses is increasing, the learning time of each course is getting shorter and shorter. Therefore, in terms of the actual situation of China's higher vocational mathematics education at present, the teaching time of basic theory courses is obviously shortened, which greatly affects the teaching quality of China's higher vocational education.

3.2 The overall foundation of vocational school students is weak

Due to the expansion of universities, employment pressure, and the increasing heat of general high schools, the number of senior graduates in China has been decreasing year by year in recent years, and the enrollment rate of vocational colleges has been decreasing year by year, even some colleges only require registration for admission. This has led to the relatively poor mathematical foundation and large differences in the level of our current students in vocational colleges.

4. The use of hierarchical teaching methods in teaching mathematics in vocational colleges

4.1 Rational hierarchization of teaching levels

As students are the most important in classroom teaching, teachers should take into full consideration the differences in educational background, thinking style, and learning ability of different students. Students are hierarchized according to their current psychological state, knowledge level, and difficulty of learning. For example, students in level A have a strong learning ability, are good at thinking alone, are flexible in their thinking, and have their own learning style; students in level B have an average foundation, are motivated, listen carefully in class, but lack proper learning methods and are not flexible in their thinking; students in level C have a poor foundation, are not very interested in mathematics, do their private things in class, and are very afraid of mathematics. In the process of implementing hierarchized levels, two points should be noted: first, they should be objective and fair, completely respecting each student and not relaxing their education just because of their bad grades; second, there should be a dynamic process, adjusting to each individual's learning situation rather than staying the same.[2]

4.2 Accurately set the teaching objectives for each level

After the students' hierarchized work is completed, the principle of "all-round development" should be strictly followed, taking the examination syllabus and curriculum standards as the main reference, and organically combining ability, knowledge, emotion, attitude and process according to the students' cognitive ability and the structure of the teaching materials, so as to clarify the teaching objectives corresponding to different levels of students scientifically and precisely. And all the objectives will be integrated in the whole teaching process. For A-level students, they are required to develop their curiosity, self-learning ability, independent thinking

ability, problem-solving ability, and to enhance their creativity and thinking ability to a certain extent, and for B-level students, they are required to complete the contents of the curriculum, and teachers are required to teach them to master the correct learning methods and establish the correct learning concepts. For C-level students, in order to make their learning ability and knowledge level meet the requirements, the teaching difficulty and learning requirements should be appropriately reduced. In the teaching process, teachers should pay attention to motivate students to learn mathematics, enhance their self-confidence, gradually eliminate their fear of mathematics, and develop good learning habits.

4.3 Organize teaching activities in levels

Depending on the teaching objectives, teachers should carry out teaching activities accordingly. Before implementing basic education, problems should first be dissected, objectives should be determined, teaching should be conducted, and then evaluation should be conducted. The correction and strengthening of problems will enhance students' basic learning skills; before implementing enhancement education, they should focus on cultivating independent learning ability, using more heuristic, inquiry and discussion learning methods, and cultivating students' induction and summary of knowledge through their self-exploration, which improves their learning level. A variety of methods are used to teach for the same level, class and method of hierarchization.

4.4 Assign after-class assignments at different levels

In the teaching of advanced mathematics, students with weak foundation often cannot digest the knowledge learned in class, while students with good foundation may not gain significantly. Therefore, when arranging homework, teachers should arrange it in a hierarchical way according to students' actual situation. Teachers can make full use of online resources to arrange students' homework, including basic and advanced questions. The general basic problems are concentrated in the after-class assignments of each chapter in the book, while the improvement problems include professional knowledge cases, as well as the questions from previous years' advanced mathematics competitions. Teachers can let students complete the basic problems in class, and then let them try to do some advanced problems by themselves to enhance their inquiry ability.

4.5 Hierarchical implementation of unit assessment

The new curriculum reform highlights the fact that one's overall ability cannot be measured by scores. Comprehensive changes should be made in the teaching of high school mathematics, and a monthly teaching assessment should be conducted for each month and used as the final test score. The test questions should be based on the examples and exercises listed in the textbook, and focus on the development of basic skills and fundamental skills for students. The exams can be administered through a single test. In basic and B level students, it is important to ensure the consistency of the test papers.

After completing the unit tests, teachers should assess the results, assist students in analyzing their problems, and point out their shortcomings so as to motivate them and improve their self-confidence in learning.

5. Problems to be noted in hierarchical teaching

Hierarchical teaching is a new teaching model, and its implementation process is bound to encounter many problems and difficulties. Therefore, teachers should have certain teaching ability and basic skills. For different levels of students, teachers should teach according to their abilities.

Therefore, it is feasible to apply hierarchical teaching to higher mathematics teaching. To achieve the purpose of hierarchical teaching, it is necessary to realize the purpose of hierarchical teaching, the organization of hierarchical teaching, hierarchized assignments, hierarchized unit assessment, and the method of continuous adjustment, optimization, and improvement in the teaching process.

Conclusion

In conclusion, introducing the hierarchical teaching mode into advanced mathematics teaching makes the teaching content more relevant and enables students to explore independently according to their actual situation. At the same time, using this teaching mode can shorten the difference of learning levels among students in the same classroom, enhance students' motivation and confidence in learning, and improve teaching effectiveness.

References:

[1] Zhao Ruijuan. The practice of hierarchical teaching in higher mathematics of higher education institutions [J]. Western Quality Education,2021,7(9):188-189.

[2] Jin Guiyan. The use of hierarchical teaching mode in higher mathematics teaching[J]. Talent,2020(24):52-54.