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Review Article

The Cultivation of Students' Mathematical Literacy Under the Background of Vocational Education

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Abstract: This article analyzes the problems in the teaching of mathematics courses in higher vocational colleges, elaborates on the relationship between innovative development and mathematics teaching, and points out the special role of mathematics in cultivating high-quality innovative talents, promoting teaching reform in colleges, and assisting the innovative development of higher vocational education. The cultivation of mathematical literacy is a subtle process. Based on the current situation of mathematics education, several suggestions are proposed to provide certain reference for the reform of mathematics education and teaching.

Keywords: Vocational education, students' mathematical literacy, and cultivation.

INTRODUCTION

As an important part of the education system, good vocational education should benefit the country greatly and individuals slightly. On the one hand, vocational education should serve the economic and social development of the country, cultivate and deliver a large number of high-quality and skilled talents to meet the needs of industrialization, informatization, and urbanization, and provide strong human resource guarantees for realizing the "Chinese Dream" [1,2]. On the other hand, good vocational education should be able to provide individuals with opportunities for growth, especially for talents with strong skills, providing ample learning opportunities and development space to help them succeed, become successful, and realize their life value. The four-year vocational education is relatively brief compared to the growth process of students, but it is extremely important for their growth [3,4]. Through the study of different courses, in addition to meeting the needs of the first position, students should also be provided with "lifelong useful" things: abilities and qualities, such as political and ideological qualities, self-learning ability, scientific thinking ability, innovative spirit and methods, and so on [5].

1. The problems in teaching mathematics courses

1. Overly one-sided understanding of mathematics courses

Teachers and students believe that the role of mathematics as a public compulsory course is only to "serve the profession" and is a tool for learning certain professional courses, excluding mathematical literacy from "professional competence".

2. Teachers cannot actively adapt to the characteristics of vocational education

Some teachers do not closely adhere to the core demands of vocational education in terms of knowledge, abilities, and quality structure in course teaching design, resulting in unclear direction and disconnection from professional needs in a series of links such as teaching methods, teaching methods, and teaching content settings. The phenomenon of emphasizing knowledge over thinking and emphasizing results over processes in teaching is quite serious now. Without refining and analyzing the mathematical thinking methods implicit in mathematical knowledge, the charm of mathematical thinking and aesthetics cannot be demonstrated, and teaching remains at a relatively superficial level, which is not conducive to the cultural and educational role of mathematics. For students, there is less inspiration and less guidance. Over time, students will only be satisfied with mechanically receiving knowledge and be lazy to think and do things.

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3. Students lack the ability to learn and innovate independently

At present, students have a one-sided idea that mathematics is important but not useful in real life, leading to a loss of interest in mathematics; In addition, some students show a weakening trend in their willingness, ability, and sense of responsibility to learn. Their high school mathematics foundation is generally weak, but they are unwilling to spend time reviewing outside of class, which directly leads to a vicious cycle of not remembering old knowledge and not being able to learn new knowledge. Over time, this group of students lacks mathematical knowledge, rational thinking ability, and particularly lacks innovative consciousness and ability.

4. The practical teaching process is still relatively weak

Constrained by traditional thinking and objective conditions, the practical process is either incomplete, unsystematic, or directly overlooked. The results of the above shortcomings or problems are that vocational school students have a weak scientific and cultural foundation, low comprehensive quality, are not good at acquiring new knowledge through self-study, cannot quickly adapt to work positions after graduation, lack the ability to analyze and solve specific problems that have not appeared in textbook teaching, lack development momentum, and it is difficult to compete with strong players.

As a mathematics teacher, facing such new problems, opportunities, and challenges, I believe that cultivating students' mathematical literacy is the key. What is mathematical literacy? Different eras have different understandings, and different people have different understandings. Mr. Gu Pei said that after many years of studying mathematics, those mathematical formulas, theorems, and problem-solving methods may be forgotten, but the mathematical literacy formed is lifelong. Mathematical literacy refers to the remaining mathematical knowledge that has been eliminated or forgotten. Its essence can be summarized as a personal ability and personality quality, mainly including learning ability, thinking ability, argumentative ability, ability to establish mathematical models, and rational, rigorous, and realistic personality qualities. The cultivation of mathematical literacy is a subtle process. In response to the current situation of mathematics education, the following suggestions are proposed.

2. Strategies for Solving Mathematics Teaching Problems

1. Clarify teaching objectives and enhance students' understanding of the importance of mathematics

With the increasing demand for talent in society and the deepening of people's understanding of mathematics, the teaching objectives of mathematics are also constantly changing. Nowadays, most of the higher mathematics teaching in vocational colleges still follows the general engineering colleges in local areas. Not only does it not highlight the special requirements for cultivating vocational education talents, but the understanding of the mathematics teaching objectives in local engineering colleges is also relatively vague, with a certain degree of arbitrariness. The teacher hurriedly finished explaining the content of the textbook, and the students passed the exam in a daze. This universal phenomenon seriously hinders the function of mathematics education and the quality of talent cultivation. Therefore, it is necessary to clarify the purpose of mathematics teaching.

We need to cultivate talents who can adapt to future social development, meet professional needs, and possess high quality. We must re understand the purpose of mathematics teaching, increase teaching time, open up modern mathematics courses, integrate teaching content, improve teaching quality, and enhance students' mathematical literacy.

2. Cultivate thinking ability and strengthen students' ability to learn and apply mathematics

On the basis of imparting knowledge, teachers should pay attention to the cultivation of thinking methods, analysis, and problem-solving abilities, which is very important for cultivating students' mathematical literacy and improving the quality of education and teaching.

For example, when teaching the concept of definite integrals, the teacher can first have students try to solve the problem of the cross-sectional area of an arch bridge, because this is not a regular shape (actually a trapezoid with curved edges), and there are no ready-made formulas to use, so students have no way to start. At this point, the teacher can guide students to use regular shapes to approximate the cross-section of the arch bridge. Students may feel that using only one rectangle to replace it would result in too much error, and may find that using multiple small rectangles to replace it would reduce the error. This completes a thinking process of discovering, analyzing, and solving problems. For the calculation of the area of a curved trapezoid, the teacher guides students to solve it through four steps: "segmentation", "approximation", "summation", and "taking the limit". Then, teach the students the distance calculation problem of variable speed linear motion. Putting aside the practical significance of the two problems, it can be seen from a mathematical perspective that the solutions to these two problems can be attributed to a specific limit of the sum equation with the same structure, thus summarizing the universal definition of definite integrals.

In addition, adopting heuristic teaching methods to guide students to raise and discover problems, and encouraging students to make bold guesses can cultivate their creative thinking. For example, when teaching the differential mean value theorem, do not rush to present the theorem directly to

students. Students can discover, generalize, and summarize it on their own. Because Rolle's theorem, Lagrange's mean value theorem, and Cauchy's mean value theorem all describe the same geometric phenomenon, that is, "on any smooth plane curve arc AB, there exists at least one point C, so that the tangent passing through point C is parallel to the chord AB.". The difference lies only in the establishment of coordinate systems and the difference in curve equations. Guiding students to express this geometric phenomenon in mathematical language not only leaves a deep impression, but also has a positive effect on developing their thinking ability.

3. To streamline in class teaching and emphasize student-centered approach

To avoid simple stacking of courses and overlapping and overlapping content, the streamlined time is left to students to arrange independently. Through guided self-study, self-study, or self selection of expansion courses, students are fully stimulated to have subjective initiative and encouraged to actively participate in the self-designed growth process.

4. Strengthen practical teaching and stimulate students' interest in learning and using mathematics

Practical teaching in mathematics is an effective way to stimulate students' interest in learning mathematics. In this process, it can cultivate their ability to analyze and solve problems using mathematical knowledge, and cultivate their innovative spirit and ability.

On the basis of strengthening the learning of basic knowledge, theories, and methods, mathematics teaching increases the content of mathematical modeling, and colleges with conditions can offer mathematics experiments. Vocational schools have also made some efforts to strengthen practical teaching in mathematics, such as actively participating in mathematical modeling competitions. However, many problems have also been exposed, such as insufficient popularity and lack of close integration with reality. Further teaching reform is needed to strengthen practical teaching in mathematics. Due to the depth and breadth of mathematics experimental courses being between the application of ordinary mathematics courses and mathematical modeling courses, a hierarchical and multi-mode teaching method can be adopted. Teaching can be organized according to the different foundations, interests, and aspirations of students, and differentiated training can be carried out to achieve the expected goals as soon as possible.

3. CONCLUSIONS

The education sector, employers, and young people have once pursued higher education unilaterally, ignoring or belittling vocational education. However, education does not represent ability. With the reform of the personnel system and the advancement of talent concepts, the advantage of education in the job market is becoming increasingly low. Employers pay more attention to the actual abilities of students and are more pragmatic in selecting talents that are suitable for their needs. Society is shifting from a one-sided pursuit of education to a shift towards ability. Mathematics teaching should also follow the trend, pay more attention to students' mathematical literacy, and provide society with high-quality new talents who can meet the first job requirements and have potential for long-term development.

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