

# Exploration and Research on Higher Mathematics Teaching in Higher Vocational Colleges under New Situation

**GUO Hua**

Anyang Preschool Normal Junior College, Anyang455000, Henan, China

\*Corresponding Author.

## **Abstract:**

Through the in-depth investigation of the main teaching means and methods of higher vocational mathematics teachers, students' interest in learning higher mathematics and their understanding of higher mathematics, this paper studies the teaching methods and reform ways of Higher Vocational Mathematics under the new situation. In this paper, Walton forest algorithm is used to make statistics and analysis of students' mathematics learning achievements. In view of many problems and deficiencies found in the survey, this paper puts forward reform and practical suggestions from the aspects of curriculum objectives of higher mathematics curriculum, characteristics of textbook compilation, teaching methods and means, teaching evaluation, teacher team construction and so on. According to the proposed reform plan, some students are tested in the author's college. The results show that students' interest in learning higher mathematics has been greatly improved. Students' mathematical modeling and higher mathematics examination scores have also made great progress. The results show that the method proposed in this paper can improve the teaching quality of higher vocational mathematics classroom.

**Keywords:** *Walton Forest Algorithm, Higher Vocational Education, Higher Mathematics, Teaching Reform.*

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## **I. INTRODUCTION**

With the rapid development of Vocational Education in China, higher vocational colleges have trained millions of full-time graduates which provided tens of thousands of specialized technical talents for the development of socialist society, promoted social progress, accelerated economic development, solved the current situation of shortage of technical talents in China, and made the growth of talents meet the actual needs of rapid social development [1-2]. It has played an important role in improving social productivity and labor level.

Higher mathematics course is an important basic course in higher vocational education. It plays a very important role in students' professional course learning and students' follow-up development [3]. Stephen, Professor of Applied Mathematics at Cornell University Stogatz said: the 21st century society needs high-tech labor [4-5]. If you want to enter the high-tech industry, you must be proficient in mathematics. If you

give up math, you won't have these opportunities at all. The importance of higher mathematics curriculum is reflected in three aspects: first, because mathematics is a methodological discipline [6-7]. It can teach students how to solve problems. Through long-term learning, we can gradually form a unique form of thinking. This will greatly help and promote the exercise and development of abstract thinking ability, rigorous living habits and logical reasoning ability. Second, higher mathematics is a tool course for students to learn professional courses; At the same time, it is also the premise for students to learn other courses in the future [8]. It paves the way for students to learn other courses. The improvement of mathematical knowledge and ability plays an important role in students' personal development in the future. Third, mathematics has a wide range of applications. With the rapid development of science and technology, the emergence and popularization of electronic products and the development of computers, the importance of mathematics is more prominent [9]. Mathematics is particularly important in all sectors of society. The progress of science and technology and the development of society are more and more closely related to mathematics, biology, physics, chemistry, surveying [10]. Engineering is based on mathematics, which can not be carried out without mathematics. It is of certain practical significance for students to strengthen their mathematics learning.

## **II. CURRENT SITUATION AND PROBLEMS OF HIGHER MATHEMATICS CURRICULUM IN HIGHER VOCATIONAL COLLEGES**

### **2.1 Students' Learning of Advanced Mathematics**

Through the questionnaire, this paper makes a profound investigation on students' interest in learning mathematics. In our college, through coordination with the school work offices of the college, some classes were randomly selected and the questionnaire was distributed to the students. The author personally distributed and recovered 800 questionnaires. Through expert analysis, 787 valid questionnaires were distributed, with an effective rate of 98.4%. The answers to the questionnaire were divided into five levels: not interested, interested, generally interested, more interested Very interested. The statistical analysis results are shown in Figure 1. As can be seen from Figure 1, our students' interest in mathematics learning is worrying. 326 students are not interested, accounting for 41.4% of the respondents, 186 students are interested, accounting for 23.6% of the respondents, 145 and 112 students are generally interested and more interested, accounting for 18.4% and 14.2% respectively, and only 18 students are very interested, accounting for 2% of the respondents. Through the discussion with students and teachers, the reasons for the above results are as follows: first, the mathematics knowledge curriculum content that students learn in school is relatively deep, while the students' foundation is poor. In particular, with the reform of the enrollment system in the past two years, the number of independent students is increasing, and the overall cultural level of these students is low, their mathematical foundation is poor, and they are difficult to learn. Secondly, there are few practical mathematics teaching contents and lack of practical application. They are basically theoretical knowledge of higher mathematics and rarely combined with engineering mathematics and majors, which is difficult to attract students. Finally, the amount of class hours students study is less, they can not carry out systematic learning and consolidation, and they only know a little about many problems.

Through the statistics of students' questionnaire, it is found that our students' cognition of learning mathematics is poor, of which 412 students think that learning higher mathematics has no effect, accounting for 53% of the respondents; There are 286 students who think it has effect, but it has little effect, accounting for 36%; The number of students who think they have a great role is relatively small, only 89, accounting for 11% of the investigated. The main reasons are as follows: students lack understanding of the background, significance and applied value of mathematics knowledge, mathematics learning knowledge can not be combined with life learning practice, students feel very abstract and can not be combined with the knowledge structure of their major, and students feel no role in learning, resulting in poor students' understanding of learning mathematics. The statistical results are shown in Figure 2.

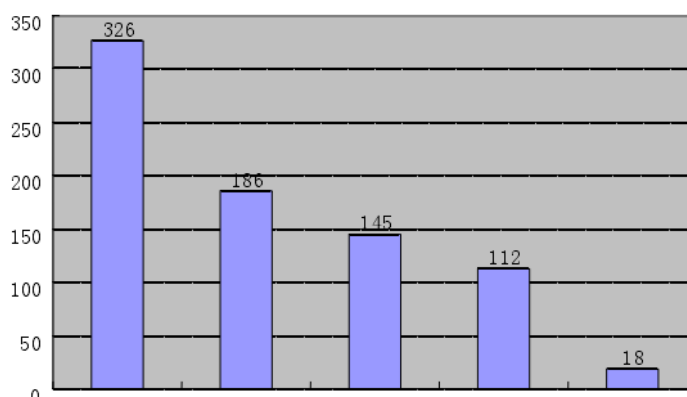


Fig 1: The statistical results for interesting

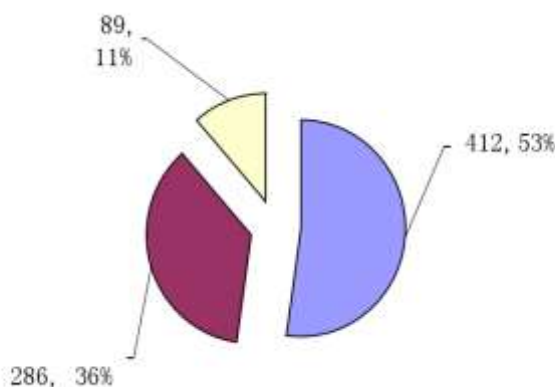


Fig 2: The statistical results for mathematical cognition

Through statistical analysis, as shown in Figure 3, 518 students in our college do not want to continue learning mathematics, accounting for 65% of the respondents. 186 students want to continue learning mathematics, accounting for 24%. Very few students want to continue learning mathematics, only 83, accounting for 11% of the respondents. The causes of this situation are analyzed as follows; Firstly, through the investigation of students' interest in learning, many reasons lead to the decline of students' interest in learning, which makes students tired of learning and makes students unwilling to continue learning mathematics; Secondly, students do not feel the use value of Higher Mathematics in the process of learning, which makes students feel that it is unnecessary to continue learning mathematics; Finally, in the

process of formulating the syllabus and teachers' teaching plans, the educational thought of mathematics teaching is still relatively backward. Basically, teaching is centered on teaching materials. All courses are realized through classroom teaching. The mathematics quality education is not in place, which leads students to stay away from mathematics learning.

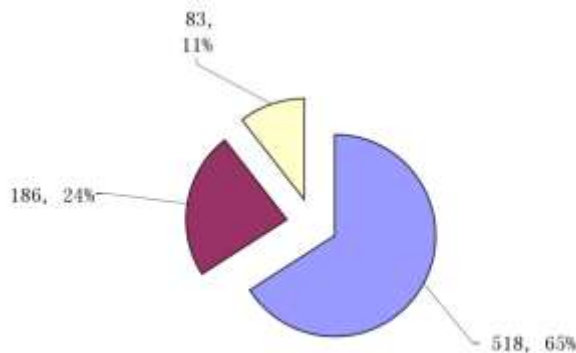


Fig 3: The statistical results for desiring to learn

## 2.2 Existing Problems

Through questionnaires and interviews with students and teachers, we find that the phenomenon of "teachers are afraid of teaching and students are afraid of learning" is common in our college. Mathematics itself is a gradual and deepening discipline. However, to a certain extent, the mathematical foundation of students in higher vocational colleges is often poor. After consulting their mathematics scores in the college entrance examination, more than 90% of the students fail. However, when they arrive at the University, they will be afraid of learning more profound things, At the same time, because teachers do not consider the learning level of students, unify teaching materials and adjust the syllabus in time, the effect of mathematics teaching in higher vocational colleges is poor. In the survey, it is found that the methods of Higher Vocational College Students in the process of learning mathematics are relatively old, their understanding of concepts is not thorough, and their thinking ability is relatively conservative; Teachers can't let go in the teaching process, and there are few expanding things, which are basically based on the book. The mathematics teaching materials used in higher vocational colleges are relatively backward. Although they have been modified for many times, the basic framework has not changed. Some contents are not in line with the learning of students in higher vocational colleges, and the contents in the teaching materials can not reflect the combination of mathematics and professional courses.

The main reason for the above situation lies in the insufficient attention paid by the Teaching Department of the university to mathematics. In some schools, mathematics teachers try their best to carry out mathematics teaching reform and apply for scientific research projects, but the university does not pay attention at all. In many schools, the serious of teachers, the students' academic performance in higher vocational colleges is very poor, and they don't understand higher mathematics at all, Reform is useless. This idea is still serious and widely spread among many mathematics teachers. Therefore, some mathematics teachers can only explain some shallow and easy to understand contents according to the wishes of students in the classroom, and there is no expansion at all. Teachers' teaching lacks passion. In the survey, it is found that 80% of students in the mathematics classroom are doing things unrelated to

learning, Some class teachers are singing monologues alone. No one in the class listens and answers questions at all. The classroom atmosphere is lifeless and the teacher's explanation is weak; At present, the mathematics teaching mode is relatively single, that is, teachers explain students' exercises, do homework, the assessment method is simple, and an examination paper is completed at the end of the semester. The unreasonable assessment system paves the way for students' negative learning. In many schools, students who fail in the make-up exam are usually given the opportunity to take a make-up exam. Students always think that the make-up exam questions are relatively simple. However, since the make-up exam is the next semester after the exam, they forget almost what they have learned after a long time. There are not many people who can pass the make-up exam. If they fail the make-up exam, the school will give students a chance to clear the exam. They fail the make-up exam, Before graduation, the school will also arrange its exams. Over and over again, many students know this assessment system and take an indifferent attitude towards learning mathematics. They can finally pass whether they study or not, which leads to the improper learning attitude of many students.

### **III. IDEAS AND SCHEMES OF HIGHER MATHEMATICS TEACHING REFORM**

Higher mathematics teaching is the most important link in the talent training mode and curriculum system of higher vocational colleges. The reform must begin with higher mathematics teaching. The reform of higher mathematics teaching must follow the law of knowledge itself. Academician Zhang Gongqing believes that mathematics is a huge organic whole, which continues to spread and grow and extends indefinitely, and the "network" and "node" at all levels of mathematics are connected by strict logic. Therefore, higher mathematics in higher vocational colleges can not only be a simple compression or simplification of Higher Mathematics in undergraduate colleges. At the same time, in the process of mathematics teaching, it should also be done step by step, so that students can connect with what they have learned. We must follow the law of talent training. The talent training programs of each major in each school are different, and the curriculum requirements for students are also different, Higher mathematics teaching must formulate the corresponding teaching contents and teaching requirements in accordance with the talent training plan, so as to lay a solid foundation for talent training. We also need to follow the laws of education and teaching. In the teaching process, teachers should always pay attention to the learning situation of students. They should not blindly focus on the classroom, blindly indoctrinate, blindly pursue the teaching progress, only care about their own explanation, reasoning and checking calculation, regardless of students' thinking. We should know that the formation of knowledge is a long process.

Teachers need to guide students to think and think, let students learn a method to solve problems, rather than let students see the results of problems, pay attention to education and teaching methods and forms, always take students as the center and students' all-round development as the center, so as to make students learn something. Higher mathematics is a necessary course to improve students' comprehensive quality such as creative thinking, logical analysis, deduction and induction, and it is the guarantee to improve students' comprehensive quality. People's depth of mathematics learning directly affects his attitude towards things. People with strong mathematical heritage can show excellent thinking ability in considering,

analyzing and solving problems. It can be seen that mathematics plays an important role in people's life development. When there are many different choices of technical route, it is also possible to reduce mistakes. No matter what kind of work in the future, mathematical knowledge is needed. The application of mathematics has spread all over various fields, especially the development of computer network. The importance of mathematics has been further confirmed. Only by learning mathematics well can students keep up with the needs of social development and adapt to the requirements of scientific and technological change.

Mathematics teaching in higher vocational colleges mainly faces junior college students. Their study time in school is at most two years. In these two years, it is very difficult to really cultivate students into what kind of talents. At most, it is a semi-finished product, and most of the ability training is slowly exercised in work practice after students go out of campus to participate in work. During school, the main content of learning is to pay attention to the development of students' basic quality, so that students have strong basic skills, social adaptability to changes in social environment, so that students have the ability of analysis and judgment, can make careful analysis and judgment in case of problems, and finally can solve problems smoothly. Therefore, mathematics education must pay attention to the development of students' mathematical quality, exercise students' thinking, learn comprehensive mathematical quality such as logical reasoning and statistical analysis, so as to develop students' creative ability and lay a solid foundation for the future society. Teachers are the core force to enhance the attractiveness of the classroom. Without the "change" of teachers and the dedication of teachers, improving the classroom attraction of higher vocational colleges is empty talk.

Mei Yiqi, President of Tsinghua University, once said: the size of a university lies not in a building, but in a master. Teachers are the carrier of imparting knowledge directly to students. Most of students' knowledge comes from teachers' teaching and guidance. Teachers' knowledge structure, ability structure, educational attitude, work attitude and teachers' teaching mentality play a very important role in teaching. A good knowledge structure and ability structure can enable teachers to boldly expand their thinking in the classroom, apply the learned knowledge to solve problems in real life, and retract and release freely and with ease. Good education and working attitude can make teachers focus on the cause of education, teach and educate people, work tirelessly, work tirelessly, and contribute to teaching. Only in this way can teachers devote themselves to teaching, find appropriate teaching methods and means, teach students according to their aptitude, take care of and care for every student, and actively communicate with students. Constantly improving students' interest in learning is conducive to students' all-round development. It can be seen that the education and teaching ability and level of mathematics teachers are directly related to students' interest in learning mathematics and the implementation and success or failure of mathematics teaching reform.

Teaching materials are the tools for students to learn theoretical knowledge. Teachers' teaching behavior must be based on teaching materials. In terms of the basic requirements of teaching materials, by consulting relevant materials, it is considered that the mathematics teaching materials of higher vocational colleges must strengthen the content of limit theory and related problems, emphasize the basic idea of calculus, but dilute various operation skills, add numerical calculation methods and optimization calculation methods, which meet the requirements of information development. With the development of

computer mathematical software, the calculation in many places does not need manual calculation, and the calculation results can be obtained only by operating the mathematical software. The survey shows that in the future work, more than 50% of the mathematical problems are solved by optimization methods. It can be seen that the content of mathematics teaching materials must pay attention to the cultivation of students' numerical methods and optimization methods. In the process of compiling teaching materials, we must pay attention to the cultivation of students' divergent thinking ability, pay attention to the learning of mathematical modeling, select some typical cases with practical significance for analysis, and strengthen the compilation of mathematical history. Interesting history is conducive to improving students' interest in learning, and pay attention to integrating the viewpoint of modern mathematics into mathematics teaching. In terms of teaching material content setting, according to the teaching content formulated by module teaching, formulate school-based teaching materials suitable for our college. The characteristics of teaching materials should be to pay attention to the cultivation of students' basic mathematical ability, synchronize mathematical knowledge and content with the construction of professional courses, apply what they have learned, and lay a good foundation for students to learn professional courses well.

We explore the application of modular teaching is to comply with the trend of higher vocational teaching. First of all, teaching materials can meet the learning needs of students in higher vocational colleges. Due to the poor cultural achievements of students in Higher Vocational Colleges and many students enrolled separately, their cultural achievements are more backward. Moreover, these students have incorrect learning attitude and mentality and poor self-discipline. To a certain extent, their understanding ability is limited. They use the existing teaching materials for teaching, They are difficult to understand and understand, and there is a strong continuity in the existing teaching materials. If they don't understand the previous knowledge, it is difficult to learn the latter knowledge, which is also an important reason why students don't want to learn the more they learn. Module teaching is to systematize mathematical problems and adopt intuitive teaching methods to make it easier for students to learn. Secondly, modules are independent of each other and do not interfere with each other. Students can choose different modules to learn and improve their interest in learning, because students can learn other modules when they can't learn this module. There are always learning modules they are interested in, and there is a large room for choice; Thirdly, it can make rational use of school resources and carry out a variety of module teaching at different times; Finally, it can improve the enthusiasm of teachers. Teachers are greatly influenced by students in the teaching process. The classroom atmosphere is active in the teaching process. The passion and mental outlook of teachers' explanation will be greatly improved, and the degree of investment will be very high. It is easy to produce teacher-student interaction and activate the classroom atmosphere. Through communication with professional course teachers, study when and what knowledge is needed in the process of professional course learning, carry out module construction, fully consider the mathematical knowledge required by students in professional course learning, learn in advance and strengthen learning. At the same time, in the teaching process, we should pay attention to the analysis of cases, strengthen the practical construction of cases, closely connect with the reality of life, solve some practical problems, let students really understand the importance of mathematics learning, urge and guide students to study actively and develop students' comprehensive ability. To study the whole working process and determine the textbook system, the following methods are mainly adopted: guided by practicality, supplemented by necessity and

sufficiency, dominated by practicality and supplemented by conceptuality. According to these principles, formulate and compile teaching materials and complete them in cooperation with professional teachers.

## V. CONCLUSION

Mathematics teaching in higher vocational colleges plays an important role in the learning process of students in higher vocational colleges. Students' mathematics performance directly affects students' ability to learn professional cultural courses, because in higher vocational colleges, many applied technologies need to be solved through mathematics. Therefore, the success or failure of mathematics teaching reform in higher vocational colleges lies in whether it helps students learn professional courses or not. This paper mainly aims at the reality of higher mathematics teaching in higher vocational colleges, investigates and studies the current situation of higher mathematics teaching in our college, and puts forward the basic viewpoints of mathematics teaching reform in Higher Vocational Colleges on the basis of in-depth investigation and analysis, in order to find methods and measures for mathematics teaching reform in Higher Vocational Colleges and contribute to the overall teaching reform in higher vocational colleges.

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