



## REVIEW

# Effectiveness of Integrating Innovative Quality Cultivation into Higher Vocational Mathematics Teaching

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### ABSTRACT

Mathematics teaching is the foundation and focus of higher vocational education. However, there are still a series of problems in the mathematics education of higher vocational colleges in China, such as students' enthusiasm for mathematics learning remain to be improved, and teachers still practice traditional teaching methods<sup>[1]</sup>. In order to effectively improve this situation, it is necessary to reform the teaching of mathematics courses in higher vocational colleges, integrate the content of innovation quality cultivation, and implement scientific and reasonable teaching methods to achieve the effectiveness of mathematics teaching in higher vocational colleges. This paper mainly studies the effectiveness of cultivating innovative quality in the higher vocational mathematics teaching, with the hope to improve the overall quality of mathematics teaching.

## 1. Introduction

In the teaching process of higher vocational colleges, students from several classes are often arranged in a class to teach, which brings certain difficulties to teachers' teaching, teachers are unable to take care of all the students<sup>[2]</sup>. Therefore, in higher vocational mathematics teaching, teachers need to innovate the traditional teaching mode, lay stress on the cultivation of students' innovative quality, actively carry out innovative quality education activities, and highlight students' principle status. In addition, the effective implementation of innovative quality teaching mode helps teachers to formulate corresponding learning plans according to the actual situation and characteristics of each student, and achieves the teaching objectives of teaching according to students' aptitude.

## 2. The Importance of Cultivating Innovative Quality in Higher Vocational Mathematics Teaching

### 2.1 Meet the Demand of Economic Development

Innovation is the key content of the development of modern society, it promotes economic development to a large extent, but innovation must take theoretical knowledge as its foundation and guarantee. As a emerging mode of modern economic development, knowledge economy is different from traditional industrial economy, which mainly gain more knowledge by the people and innovate with the knowledge mastered. Creativity is the key to social development, it mainly covers management innovation and knowledge innovation service. At this stage, creativity has become the dominant social labor force; knowledge promotes social progress and is the foundation of social

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and economic development<sup>[3]</sup>. As a result, in the process of mathematics teaching in higher vocational colleges, teachers should strengthen the cultivation of students' innovative quality to adapt to the development of social economy.

## 2.2 Realize the Sustainable Development of Society

In the rapid development of society, innovation ability is the core force of social sustainable development, not only should we pay attention to the economic development of industrialization and modernization, but also we need to transform the traditional economic model to the psychological, ideological and behavioral model of modern economy, the quality of people's work is constantly improving, China has entered the development of a modern country and provided support for the sustainable development of society<sup>[4]</sup>. Hence, in the process of education and teaching in modern higher vocational colleges, the cultivation of innovative quality plays an important role.

## 2.3 In Response to the Education Reform

With the rapid development of social economy, China's education reform is increasingly deepening, and many new curriculum concepts are put forward : 1), Education are open to all students; 2), Focus on the cultivation of students' scientific literacy; 3), Actively explore learning activities<sup>[5]</sup>. In the context of new curriculum standards, mathematics science refers to students' participation in social life and economic activities, improve students' decision-making and scientific inquiry ability, the main content of which is to clarify the coordination of science , technology and social development, deeply understand the nature and value of science, improve students' ability to collect and process information, and cultivate students' innovative practical ability.

## 3. Current Situation of Innovative Quality Cultivation in Higher Vocational Mathematics Teaching

With the rapid development of social economy, higher vocational colleges pay more and more attention to the cultivation of students' innovative quality, this has gradually become the focus of vocational education reform, especially in higher vocational mathematics teaching, many higher vocational colleges have explored in depth the relevant content of the cultivation of innovative ability, and all walk of life are more and more concerned about the National College Student Mathematical Modeling Competition<sup>[6]</sup>. However, in the process of cultivating innovative quality of higher vocational mathematics teaching in China, there are still a series of problems that affect

the effectiveness of teaching. This paper mainly analyzes the current situation of innovative quality cultivation in higher vocational mathematics teaching.

### 3.1 Mathematical Modeling Teaching Hasn't Been Popularized

With the fast development of modern society, more and more people start to concern about the National College Student Mathematical Modeling Competition, mathematical modeling is the key to cultivate students' innovative quality, students improve their practical and innovation ability through the participation in mathematical modeling. But in actual higher mathematics teaching, mathematical modeling and competition are generally only open to excellent students, and have not been fully popularized, very few students can benefit from it.

### 3.2 Education Idea of Teachers in High Vocational Colleges Remains To Be Updated

In the process of education and teaching in modern higher vocational colleges, teachers need to update their educational idea, this could be seen from the theoretical knowledge, and the teaching theoretical background of teachers' vocational education , the teachers are unable to give students teaching practice instructions, the main reasons are :1), Teachers in ordinary colleges and universities have generally learned the basic theory and knowledge of education, but they do not understand the actual situation of higher vocational colleges and cannot establish a correct concept. 2), Higher vocational teachers seldom have the chance to participate in the training activities of educational ideas after obtaining the Teacher Certification, thus are incapable of updating their education idea in time.

### 3.3 The Conservative Teaching Phenomenon of "Enough" Is Common In Teaching

Different from other professional courses, higher vocational mathematics teaching has strong flexibility and cannot obtain obvious teaching results in a short time, this leads to the weakening and marginalization of mathematics in the professional curriculum system as well as the reduction of teaching hours<sup>[7]</sup>. For example, in the mathematics curriculum setting of a higher vocational college, teachers generally launch practical teaching activities from the freshman semester, mathematics class hours are generally about 46 class hours, the main content of courses is unary function and calculus, in the case of inadequate class hours, teachers implement the teaching methods of "enough", "must" in practical teaching in order to complete teaching tasks, carry out teaching according to the

key content of the professional courses and the content that students need to master, neglect the individual differences of students, therefore, in order to catch up with the learning progress, some slow learners spend a lot of time in solutions and operations of mathematical word problems, it is common they copy or imitate the solutions, this cannot cultivate students' innovative ability.

### 3.4 Teacher's Misunderstanding of Professional Ability

In the development of modern society, practical teaching have brought forward higher requirements for teachers' professional ability, the focus of teaching is the impact of teacher behavior on students' specific cognitive behavior and emotional behavior, but many teachers cannot understand this accurately, and some teachers who graduated from colleges and universities generally think that their knowledge and professional ability are adequate for practical teaching, these teachers do not care for the development of the education industry, and fail to learn new skills, which seriously influences the effectiveness of mathematics teaching in colleges.

## 4. Main Reasons of Mathematics Teaching Problems in Higher Vocational Colleges

There are still a series of problems in the mathematics teaching in higher vocational colleges, the main reasons are: 1), Compilation of textbooks. There are problems in the compilation of Higher Mathematical textbooks, such as the textbook is compiled casually, this exists in many colleges and universities. 2), Teachers do not take mathematics teaching seriously. In many vocational colleges, schools does not pay enough attention to the teaching of higher mathematics, neglect the professional knowledge of students, some majors were considered have little to do with higher mathematics, and even cancel mathematics courses; 3), Influence of traditional teaching methods. Teachers still apply traditional teaching methods in modern society, teachers seldom have interactions with students, and students do not take the initiative to ask teachers when they encounter problems, and lose interest in mathematics learning in higher vocational colleges in the long term development.

## 5. Integrating Innovative Quality Cultivation Strategy into Higher Vocational Mathematics Teaching

### 5.1 Focus on Innovative Quality Education

Teachers should emphasize the cultivation of students'

innovative quality and improve students' innovative consciousness in higher vocational mathematics teaching, the integration of innovative literacy cultivation enables students to learn a certain mathematical problem as well as to learn by analogy, complete the mathematics courses in a proper way. The integration of innovative literacy cultivation in higher vocational mathematics teaching makes students to extend the quality of innovation, help students to cultivate innovative quality independently. Moreover, the integration of innovative literacy cultivation enables students change their learning ideas, teachers change the traditional teaching methods, which will not only cultivate students' innovative ability, but also improve teachers' teaching quality, and achieve the effectiveness of mathematics teaching in higher vocational colleges.

### 5.2 Create a Good Atmosphere for Higher Mathematics Study

Students are susceptible to various external factors in education and teaching in higher vocational colleges. For example, "desertion" is common among students in practical teaching, which greatly affects students' learning situation<sup>[8]</sup>. For this reason, teachers should create a good teaching atmosphere in higher vocational mathematics teaching, make students concentrate their attention in a harmonious learning environment and improve their learning quality. For instance, when explain knowledge related to probability, teachers should follow the following teaching methods: 1), Teachers introduce probability events in daily life to create good teaching situations for students, such as weather forecasts, lottery ,etc., which could stimulate students' interest in learning. 2), Teachers could introduce mathematical culture, help students to understand the principle of lottery winning by using the probability knowledge, guide students to strengthen the study of teaching content; 3), Teachers should explain to students the harm of gambling, so that students can develop correct values, improve their comprehensive quality and provide support for the effectiveness of higher vocational mathematics teaching.

### 5.3 Introduce Multimedia Teaching Mode

In the class teaching of higher mathematics in higher vocational colleges, teachers should also attach more importance to the innovation of teaching mode and introduce more advanced teaching tools and teaching methods. In the Internet age, teachers can introduce multimedia teaching methods; apply it to the actual classroom as an auxiliary tool to stimulate students' study enthusiasm. For instance, teachers could use multimedia courseware

to present complete geometric contents when explaining solid geometry, it helps students to establish three-dimensional thinking, the three-dimensional dynamic diagram presented by multimedia teaching mode help students better understand the content of the textbook. In addition, teachers could also use multimedia courseware to broadcast information related to mathematicians to students and stimulate students' study enthusiasm, mathematicians may bring more inspiration to students in the process of studying mathematics problems, and it could stimulate student's learning interest by playing videos of relevant knowledge, engage students with the practical mathematics teaching. Therefore, the innovation of higher vocational mathematics teaching modes occupies an important position in classroom innovation; it can improve the overall efficiency of classroom teaching and stimulate students' learning enthusiasm.

#### **5.4 Guide Students to Think Independently**

In the higher vocational mathematics teaching process, teachers should lay more emphasis on the cultivation of students' ability of independent thinking and introduce more modern teaching methods, such as the inquiry teaching, discover the student's advantages and encourage them, in this process, students need to study and explore consciously, improve their scientific research ability and independent thinking ability<sup>[9]</sup>. At the same time, teachers could teach on the basis of the typical problems in practical teaching, provide more relevant information for students, and make more severe requirements for students' actual study, teachers should play their guiding role during the course of practical exploration of students, provide effective suggestions for students to help them realize that laws of things is the nature of the development of things. Besides, mathematics has strong logicity, teachers should guide students to develop the good habits of independent thinking and stimulate students' learning enthusiasm, guide students to explore independently, allow students to analysis and summarize independently, to find and solve problems in learning in time. Creative thinking is conducive to the development of students' divergent thinking, and provides support for the innovation of mathematics teaching in higher vocational colleges.

#### **5.5 Integrate Concept Innovation with Practical Exploration**

In general, creative behavior is based on knowledge question, in the actual teaching process of higher vocational mathematics, teachers should focus on cultivating students' questioning consciousness, highlight students'

principal status and stimulating their innovative thinking, to achieve the expected goal of innovative quality cultivation, teachers should also encourage students to ask questions about mathematics, which could effectively stimulate students' enthusiasm for mathematics learning, create an active classroom learning environment and improve the traditional classroom mode, and then realize the cultivation of students' innovative quality. Teachers can also introduce advanced teaching methods, such as situational teaching and game teaching, to enable students to take an active part in the classroom learning, so the students could ask teachers or other students for advice when they encounter a problem in the process of learning, when teachers and students have different views, everyone should discuss together to achieve the expected goal of education through entertainment, in this way, teachers could fully understand the real thoughts of students, help the teachers and students to establish a good relationship, and guide them correctly and systematically. For instance, the teachers could divide students into groups via games by using group cooperative teaching method, one group ask questions and the other answer questions, then switch roles, each correct answer scores one point, compare the scores of two groups, the group with higher scores is the winner, this will effectively enhance students' ability to innovate and explore, by participating in the questioning game, the theory and practice are integrated effectively, which inspires the students' study enthusiasm.

### **6. Conclusion**

Above all, in the reforming and transformation of higher vocational mathematics teaching, the cultivation of innovative quality is the key to practical teaching, and teachers must attach importance to it<sup>[10]</sup>. In order to achieve the expected goal of the course reform of mathematics teaching in higher vocational colleges, teachers need to change the traditional teaching concept as well as teaching mode, put emphasis on the cultivation of innovative quality, integrate it into the practical teaching to cultivate more excellent innovative talents.

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