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The Combination of Information Technology and Mathematical Teaching in Middle School

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Abstract

Information technology is changing the classroom teaching mode. It is the goals of the combination of information technology and mathematical teaching in middle school that contributes to the realization of the course goal of the new curriculum standard, improvement of students' ability to study and teachers' ability to teach and research. It sticks to the principle of subjectivity, interactivity and efficiency. The main methods for combination are the providing of hardware environment, the master of using software, the creating of effective setting, and the launch of exploratory activities.

Keywords

Information Technology; Mathematics in Middle school; Teaching Practice; Combination.

1. RESEARCH BACKGROUND

With the rapid development of information technology, people's lifestyle has been changed, and so does the teaching mode of the traditional class. For teaching practice, information technology brings no only opportunities but also challenges. The combination of information technology and other courses has become the spotlight of current education for this bilateral and contradictory relationship.

The process of combination could be mainly divided into three periods, the period of CAI, the period of CAL and the period of IITC. The aim of combination is to build an ideal study and technology-based environment or a new teaching mode under the principle of comprehensive thinking. There is a close relationship between information technology and teaching practice. On one had, information technology has changed teacher's teaching. Information technology provides important tools and assistant methods, which makes many unreachable teaching methods possible. With the help of information technology, teachers can arouse students' interests, and fully motivate students' inner motivation to study. In such class, through information technology, students can learn more technology, skills, methods and values from media. Teachers can create exploratory, cooperative and resource-shared class, and make class a multilateral studying place. On the other hand, information technology has changed students' study. With the combination of information technology, students' motivation and interest can be aroused and the abilities of exploring, self-study, innovation and cooperative study can be challenged. The combination of information technology and teaching practice is an important method to cultivate the talents for the new era, and is also a necessary factor for the improvement of worldwide education.

Mathematics curricular standards for full compulsory education set by the ministry of education points out that as one of the important methods to radically change maths studying mode, information technology should be fully employed. As an assistant tool, it can help teachers practical teaching and research, students' maths studying activities and evaluate students' maths studying. Subject Standard for Senior Mathematics also points out that teachers should emphasize the use of information technology to optimize class teaching and

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transform the type of teaching and studying. Up to now, the traditional teaching mode is still widely used in class in middle school, mainly the method of lecture. However, still many teachers try combining these two, by replacing blackboard writing with PPT. Also, some videos are used. A few teachers use geometric drawing board in class. There is still a long way to go for the combination.

2. REMARK ON CURRENT STUDY

Developed countries pay more and more attention to the use of information technology in the mathematics courses and mathematics teaching. As the first nation to own computers, America takes the leading role in the study of information technology. In 20th century, America started to conduct theoretical and practical research on the combination of information technology and teaching practice. In 1989, National Council of Teachers of Mathematics published the Mathematics Courses and Evaluating Standard at School, which points out that the importance of information technology has overran that of blackboard, and it should be supported in teaching.

Japan also takes a worldwide leading role in this area. In 1998, Japan published a report about the general direction on the improvement of courses, which emphasizes it is necessary to have computer class in middle school and positively use information technology in mathematics teaching in middle school. The most evident feature of Japanese mathematics teaching is the use of information technology in the process of mathematics teaching and education management. It views information technology as an important feedback in class.

In 1990s, information technology was first proposed to combined to teaching practice. On 25th, October, 2000, the minister of education, Chen Zhili, proposed to fully conduct the combination of information technology and other subjects. From then on, the combination of information technology and teaching practice has become spotlight. In 1995, geometric drawing board was first used in our mathematics class. The combination of geometric drawing board and teaching practice made great achievement, with many good examples. The Practical Directions for Geometric Drawing Board, written by teacher Tao Weilin, includes the directions and how to use it in the mathematics teaching practice, with many examples. In 2001, Academician Zhang Jingzhong led the construction of "Z+Z intelligent education platform", which is linked with the present mathematics textbooks. In 2007, Wang Changpei, Cao Yiming and others researched on the project of "the combination handheld technology and mathematics teaching in middle school", which made prominent achievement. In 2011, the setup of GeoGebra college in Peking Normal University, made a foundation for the extension and application of this software in China.

In conclusion, the foreign research on the combination on information technology and teaching practice has operated since the 20th century. It emphasizes the importance of information technology overrunning that of blackboard. Foreign research also helps the research in China. In china, there is the foundation for research, but it is far behind the foreign.

3. THE TASKS FOR THE COMBINATION OF INFORMATION TECHNOLOGY AND THE MATHEMATICS TEACHING PRACTICE IN MIDDLE SCHOOL

The clear tasks is necessary for the combination. After referring to lots of research results and data, three important tasks are concluded.

3.1. Contribute to the Realization of Objectives Under the New Curriculum Standard

The general goal of mathematics curriculum in compulsory education stage is to develop in four aspects of knowledge, skills, mathematical thinking, problem solving and emotional attitude. Students can master four kinds basic knowledge and skills. For the goal of mathematics

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curriculum in senior high school, students have to master six more core qualities for mathematics. Quality is new word, first proposed in this education reform. However, how to realize the objectives under the new curriculum standard efficiently? Many researches prove that traditional teaching mode is not proper for the new objective. The change in teaching mode has become a necessity. With technology, class can be more efficient. With the combination of information technology, the new teaching mode, like exploratory class, cooperative class, turnover class and online class, can contribute to the realize the objectives. While, information technology is not the only thing that important. The use of it should be proper, not blindly and randomly. The combination of information technology is only to realize the objectives. If not, it has no reason to exist.

3.2. Improve Students' Study Ability in the Information Era

In the information era, people's study style has been radically changed. Students can do a self-study with the resource of information technology, take advantage of online platform to do a cooperative study, and process the information in an innovative way. In this era, people's ability to get information is improved, so the competition between students become fierce. Teacher's teaching can be very useful. Students have to learn in the new mode to take a leading role. The combination should stick to improving students' self-study, cooperative study, exploratory and innovative abilities.

3.3. Improve Mathematics Teacher's Ability to Teach and Research

In the information era, teachers have to improve themselves. In the teaching practice, it is likely that there is something beyond students' knowledge. During the combination, teachers can create environment through different channels, and use information technology in the research of class teaching activity. The combination includes not only the ability development of students but also the development of teachers. It helps improve the ability to teach mathematics and research on it.

4. THE PRINCIPLES FOR THE COMBINATION

The combination doesn't mean the simple use of information technology in class teaching. The combination must comply some principles, which makes the combination effective.

4.1. Subjective Principle

In the past, the centre of class in the teacher. Teacher is the centre of the class teaching. Students get knowledge and skills. Teacher take the role to teach, to convey knowledge, and to solve problems. However, in the information era, the lecture mode class can not take more task to cultivate students' qualities. The body of the teaching is turned to the student. Teacher become the guider, cooperator and researcher to help students to learn, not a authority any more. Student become the body of study, active participants and the active builder of knowledge. After breaking the limits of time and space, information technology emphasizes the study from students, and makes the teaching become a bilateral and cooperative process, which provides a very ideal environment for students to be active and innovative. It fully shows the subjective position of students, and the aim of students' self-study, self-thinking. It helps build a new relationship guided by teacher, and joined by students.

4.2. Interactive Principle

Interactive principle includes the relationship between people and machine, between teacher and student, and between students. The combination must include these three. The interactive between people and machine means teacher and students should fully use many sense and media to get information. The interactive between teacher and students means under the

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guidance of teachers, students take part in teaching activities, including, self-study, cooperative group study and exploratory study and so on. During the interaction, students can better acquire knowledge and improve ability, and teacher can better know students. The interactive between students means in the teaching practice, students communicate with each other, and know more about themselves. These kind of interaction mainly exists in the cooperative class. Students should extend their communication through internet, and unleash the limit of former ideas, facing the wold and broadening horizon. They can also improve their contact ant cooperation with others.

4.3. Effective Principle

Effective principle means in the teaching practice, the information technology should be effectively employed, in order to motivate its positive side for mathematics study, and lessening its negative side. In the teaching practice, the more is not the good. We shouldn't use information technology as a tool to shorten the thinking process or increase the teaching capacity. We shouldn't replace the practical work with the simulation on the computer. We shouldn't replace students' imagination with computer, which will lessen students' ability to explore the laws in mathematics.

5. THE METHODS FOR THE COMBINATION OF INFORMATION TECHNOLOGY AND MATHEMATICS TEACHING PRACTICE IN MIDDLE SCHOOL

It's time to think about how to apply the theory into the practice. Due to the speciality of this subject, the combination has a evident feature. Different teaching tasks have different methods. Four methods can be concluded.

5.1. To Provide Hardware

To combine information technology into the mathematics class, the complexity of hardware environment should be ensured, such as computer, electrical whiteboard, pad, and internet.

5.2. To Master the Use of Software

To combine information technology into the mathematics class, the foundation of proper software should be ensured, such as geometric drawing board, GeoGebra, SPSS and so on. Teacher should know how to use them, and set different tasks according to different software.

5.3. To Create Effective Environment

For the advantage of combination, information technology can create lively environment, such as a game, a video or a question. These can motivate students to be addictive to the class. Teacher should be able to create these environments, and not every environment could be proper to motivate students. Ineffective environments could divert students' attention to the technology itself, not to the teaching itself. In order to create effective environment, teacher should be clear about what to do next, be good at controlling the whole class, have a good understanding of the objectives, and have a good control of the teaching process and students' attention.

5.4. To Carry Out Exploratory Activities

After creating the effective environment, it is time to carry out exploratory activities. They can self-centred, or a group work. The process of exploratory activities can improve students' exploratory, innovative and applying abilities. It can also improve students' mathematical qualities. Teacher should give clear objectives and enough time and space for students. If they need help, teacher should give proper help. When teachers carry out exploratory activities, they need to broaden students' research method. Students should refer to the internet and have a

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group discussion on the problem, give out opinions on the internet, and put forward some effective information for communication.

6. CONCLUSION AND DISCUSSION

Due to the lectured teaching mode in the most class, it is necessary to research on the meaning and strategy of the combination between information and mathematical teaching practice in middle school. On one hand, it is meaningful for many teachers who have to get into the classroom every day. Many teachers still don't use it in their class. Some of the teachers think that it has nothing with students' grade, only exercises contributing to the increase of grade. Some understand the necessity, but don't know how to apply it into class. Thus, this thesis could give a theoretical guidance. On the other hand, the combination could contribute to the reform and innovation in compulsory education. Mathematics has always been the important one . The experience could also be extended into other similar subjects, which will help other subjects and contribute to the reform and innovation in education. The combination must follow the principals, heading for the objectives with efficient methods. Then it can be into practice.

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