

Research Review on the Application of Geometer's Sketchpad in Mathematics Teaching in Middle School

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Abstract: In recent years, with the massive application of information technology, multimedia technology as a new teaching method has attracted widespread attention in teaching reform. In order to improve the teaching quality of mathematics learning, this article conducts a study of domestic documents about the application of Geometer's Sketchpad in mathematics teaching in middle school, and analyzes the concepts, functions, advantages and application methods of Geometer's Sketchpad. It is concluded that the effective integration of Geometer's Sketchpad and mathematics teaching can improve the teaching level. The study found that the current research on the application of Geometer's Sketchpad still has the problem of insufficient specificity and comprehensiveness and field imbalance. Future research in this area should use a combination of theory and empirical research methods, develop research in various fields in a balanced way.

Keywords: Geometer's Sketchpad; Mathematics Teaching in Middle School; Application

1. The background of the research review

Nowadays, with the gradual improvement of the level of science and technology, more and more information technology is widely used in our lives. Teaching and learning, as an indispensable part of our lives, have also undergone important changes under the promotion of modern educational technology. The Mathematics Curriculum Standards for Compulsory Education pointed out that the development of modern educational technology had a great impact on mathematics teaching. This tool should be used reasonably in the teaching process to effectively improve the methods of teaching and learning. Geometer's sketchpad, as an emerging information-based teaching tool, has become a widely used auxiliary teaching tool in middle school mathematics teaching by virtue of its flexible dynamics, convenient operation and other functions. Therefore, we reviewed the current research literature on the application of Geometer's Sketchpad in mathematics teaching in middle school.

This research adopts the method of literature research, using "Geometer's Sketchpad" and "mathematics teaching in middle school" as keywords to search on CNKI, retrieved 258 related documents, select relevant research literature for analysis and review. It is expected to provide inspiration for the development of the application research of Geometer's Sketchpad, and promote it to play a better role in the teaching process.

2. Content overview of existing research literature

2.1 Research on the concept and function of Geometer's Sketchpad

For the concept of Geometer's Sketchpad, no clear definition has been given yet, but most scholars have basically similar understanding of it. Researcher Yang Fengwu believes that the Geometer's Sketchpad is a dynamic geometry tool suitable

for vector analysis and drawing of mathematics, plane geometry and physics. Teacher Zhang Huiju believes that Geometer's Sketchpad is essentially a multifunctional operating software that can be widely used in architectural design, mathematics, physics and other aspects.

Through research, we found that Geometer's Sketchpad can be summarized as a multifunctional integrated operating software. Its functions can be divided into dynamic functions and operable functions, including drawing, animation, calculation, deduction and so on.

2.2 Research on the application advantages of Geometer's Sketchpad

Many scholars have conducted research on the application advantages of Geometer's Sketchpad and put forward their own opinions. Scholars Jiang Ting and Zhao Juan mainly summarized the teaching advantages of Geometer's Sketchpad as the following three points: Firstly, Geometer's Sketchpad can carry out dynamic picture demonstrations. Secondly, Geometer's Sketchpad can better display the details of the graphics through the zoom function. Thirdly, the Geometer's Sketchpad is simple, convenient and fast to operate. Teacher Geng Yayuan proposed that the advantages of Geometer's Sketchpad determine its use value, and it can be applied to all aspects of mathematics teaching in middle school, including geometry, algebra and problem-solving teaching.

By comparing their points of view, we found that most scholars' cognition of the superiority of Geometer's Sketchpad is to analyze its function. At the same time, we also found some differences in our research. Most scholars' analysis of their advantages is limited to classroom teaching itself, while scholar Yang Fengwu breaks through the classroom and puts forward the viewpoint of promoting teachers to develop school-based courses. Therefore, for the analysis of the application advantages of Geometer's Sketchpad, it can be analyzed from more angles and selected focuses.

2.3 Research on the application strategy of Geometer's Sketchpad

Due to the continuous development of modern educational technology, the Geometer's Sketchpad is more and more widely used in mathematics teaching classrooms, and many educational researchers have conducted research on its application strategies. Professor Hu Huachun and Fu Encheng analyzed the application of Geometer's Sketchpad in geometry teaching through topics and specific cases such as understanding triangles: First, create problem situations to deepen students' understanding of concepts. Second, make use of dynamic graphics transformation, carry out variable teaching. Third, use dynamic demonstration to verify the law. And Professor Liu Wenhua gave specific operations and teaching guidance on the application of the Geometer's Sketchpad in the teaching of plane geometry theorems, algebraic formulas and solid geometry theorems.

Observing the current literature review, some studies have made specific case analysis and explanations on the application strategies of Geometer's Sketchpad, but most of the studies only generalize the methods and effects of its application.

3. Existing problems and research prospects

3.1 The research method is not specific and comprehensive enough

At present, with regard to the research on the application of Geometer's Sketchpad in middle school teaching, researchers have the shortcomings that the research methods are not specific and comprehensive. Most scholars use the literature research method to analyze and summarize the existing literature, and make some superficial analysis from the theoretical level in general, but lack focused analysis and description of specific teaching cases. In future research, scholars should strengthen empirical research on the basis of theoretical research, to make the research more convincing and promote Geometer's Sketchpad in-depth development of applied research.

3.2 Imbalance in research fields

Nowadays, the content of research on the application of Geometer's Sketchpad in middle school mathematics teaching involves all aspects, and most of the content has been studied. However, at the same time, we also discovered that there is an unbalanced problem in the field of research. Most researchers will study the advantages and strategies of the application of Geometer's Sketchpad, but few people conduct analysis and exploration on the disadvantages of the application of it.

Therefore, in future research, we should strive to improve the overall pattern of the application research of Geometer's Sketchpad, and promote the balanced development of the research.

4. Conclusion

Based on the analysis and summary of the opinions of the above researchers, we have concluded that the Geometer's Sketchpad, as a multifunctional operating software integrating animation, drawing and calculation, plays an important role in improving the quality of classroom teaching. In the teaching process, teachers can use the Geometer's Sketchpad to create problem situations, dynamically demonstrate graphics, analyze teaching difficulties, carry out interactive teaching and practical activities. In this way, to stimulate students' enthusiasm for learning mathematics, deepen students' mastery and understanding of knowledge, cultivate students' mathematical and logical thinking ability, practical ability and innovative consciousness. At the same time, in the future research on the application of Geometer's Sketchpad, the research should use the method of combining theory and empirical, and develop research in various fields in a balanced way, so as to promote development of the research on this topic.

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