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The research on application of tablet pc in middle school mathematics teaching

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Abstract
With the rapid development of information technology, Tablet PC was introduced into middle school mathematics teaching. Especially in the past decade, more and more schools have explored the application of Tablet PC in teaching, and a series of related research has emerged. The research has not only promoted the integration of Tablet PC and mathematics teaching, but also made the application of Tablet PC more reasonable and scientific. This paper summarized more than ten years' research on the application of Tablet PC in middle school mathematics teaching, so as to provide references for further studies in the future.

Keywords: middle school mathematics, mathematics teaching, Tablet PC

1. Introduction
Through a series of practices, the function of the Tablet PC in teaching has been more and more fully explored, which is embodied in the digitization of learning resources, learning tools and learning management (Xiang, S., 2015) [1]. The emergence of the Tablet PC has made up for some of the shortcomings in traditional teaching and made students more active in learning. The timely feedback of the Tablet PC also allows the teacher to solve student's questions in the first time, which greatly improves the efficiency of the classroom. In order to further enrich the application research of Tablet PC in middle school teaching, this paper intends to review and sort out the relevant researches in recent years, and induct and summarize the results and methods.

2. The application value of tablet PC in middle school mathematics teaching
Tablet PC has become popular in classroom teaching due to its convenience and richness of resources. Bu Chunxia, Li Zhushan and Xu Hui believed that Tablet PC overcomes the shortcomings of traditional textbooks and static books for students. The Tablet PC creates a lively and interesting teaching environment, which enables students to enter a lively learning atmosphere (Bu, C. X. & Li, Z. S. & Xu, H., 2013) [2]. Yang Kun pointed out that situational teaching is conducive to stimulating students' interest in learning. Teachers use the Tablet PC in the teaching process to make the boring and old-fashioned learning become interesting (Yang, K., 2012) [3]. Zhao Yanhong mentioned that teachers can completely break the various deficiencies of the traditional teaching mode by means of the Tablet PC, thus stimulating students' enthusiasm for learning through the real teaching situation (Zhao, Y. H., 2016) [4].
Bu Chunxia, Li Zhushan and Xu Hui believed that Tablet PC achieves layered teaching, and students can choose learning content according to their actual situation, teachers can help students find the point of interest and stimulate students to explore the internal motivation of knowledge (Yang, K., 2012) [3]. Chen Cuizhu mentioned that Tablet PC can automatically choose different exercises for students of different levels. Teachers can use the Tablet PC to keep track of the progress of the whole class and the accuracy of each question. The teacher can also click on the student number to find out the specific completion of individual students. In this way, teachers can timely understand the students' mastery of knowledge point and provide different learning guidance for different students, so that teachers can really teach students according to their aptitude (Chen, C. Z., 2012) [5].
Zeng Chunna and Hu Jin believed that using the mind map app on the Tablet PC, teachers can help students establish links between knowledge points, and then enhance understanding of knowledge points in a very intuitive way (Zeng, C. N. & Hu, J., 2018) [6]. Zhang Wenyu, Yang Rui and Wang Guangming mentioned that the mind map in the Tablet PC can help students sort out the knowledge, clarify the context, consolidate new knowledge, form their own knowledge network, and improve learning efficiency (Zhang, W. Y. & Yang, R. & Wang, G. M., 2015) [7]. Chen Rongqing believed that compared with traditional paper-and-pencil mapping, the mind map based on Tablet PC is more comprehensive and clear, and there is no capacity limit. Students can modify and improve the mapped mind map at any time. Drawing a structure diagram in time after students complete the knowledge points can cultivate good study habits and structured mindsets (Chen, R. Q., 2016) [8]. Liu Haifeng believed that mind map can make students' thinking about mathematics more clear, and it can facilitate students to combine new knowledge with old knowledge, and effectively improve students' learning efficiency (Liu, H. F., 2018) [9].
Xiao Anqing and Zhang Yuan believed that introducing the Tablet PC into classroom teaching can enable students to live in an information environment for a long time. If classroom teaching is turned into the main channel for cultivating information awareness, learning information knowledge, and correcting information ethics, children will become the "indigenous inhabitants" of the information society and will not lose their way in enjoying the information feast (Xiao, A. Q. & Zhang Y., 2012) [10].
Huang Fei mentioned that the introduction of Tablet PC into high school classroom teaching can enable students to live

in an information environment for a long time, improve students' ability to perceive and acquire information, and provide opportunities for students to improve their information literacy (Huang, F., 2014) [11].

Huang Fei mentioned that after the introduction of the Tablet PC into the classroom, teachers can communicate with each student in a timely manner. Some of the learning content can also be completed by students and teachers in the classroom. This not only improves the initiative and enthusiasm of students, but also strengthens the communication between teachers and students (Huang, F., 2014) [11]. Zhao Yanhong mentioned that the rational use of the Tablet PC can effectively enhance the interaction between teachers and students, so that students and teachers can enhance their learning ability in effective interaction, thus realizing the purpose of teaching and learning. In addition, with the reasonable use of the Tablet PC, teachers and students can communicate freely anytime and anywhere, instead of being limited to the classroom (Zhao, Y. H., 2016) [4].

3. Defects and Shortcomings of the Application of Tablet PC in Middle School Mathematics Teaching

3.1 In Terms of Student Learning

Yang Kun pointed out that Tablet PC has built-in a large number of games, whether entertainment games or teaching games, which have great attraction for primary and secondary school students. However, the self-control ability of primary and secondary school students is not strong, so they are easily addicted to games and then wasted study time. The Tablet PC can create a relaxed and entertaining learning environment for teaching. It is easy for students to relax too much and produce the emotion of "retreating from difficulties" rather than "going up to difficulties", which makes it difficult to cultivate students' spirit of exploring and researching knowledge (Yang, K., 2012) [3]. With the increasing use of Tablet PC, many parents are worried that students will be addicted to video games, forget the original intention of education and learning, and forget the communication with partners (Chen, C. Z., 2012) [5]. Huang Fei believed that when students have not formed a correct view of information, the introduction of Tablet PC may distract students and affect their learning (Huang, F., 2014) [11].

3.2 In terms of teacher teaching

Huang Fei believed that the teaching tasks of middle school teachers are very heavy and the teaching pressure is great. If teachers want to use the Tablet PC to teach, all teaching content and teaching activities must be preset to the device in advance. However, there are no ready-made e-textbook resources that can be directly quoted, and many require teachers to develop and produce themselves, which brings a huge workload to teachers (Huang, F., 2014) [11].

3.3 In terms of teaching content

Yang Kun suggested that teaching requires rigorous logic and a high degree of abstraction, which is different from ordinary life and entertainment. If teachers use the Tablet PC to teach all the content, it will easily lead to the over-mechanization of teaching (Yang, K., 2012) [3]. Ge Guang believed that the content of mathematics teaching is rich and diverse, and it is impossible to complete all teaching with single software (Ge, G., 2016) [12].

3.4 In terms of the system itself

Ge Guang mentioned that the stability of the system is not strong and it is easy to cause the course to stop. When the campus network is in an unstable state, the Tablet PC device cannot log in to the teaching system and cannot evaluate the teaching situation. When the student or teacher's Tablet PC device suddenly fails in the classroom and cannot be repaired immediately, the whole class will be affected (Ge, G., 2016) [12]. Liu Haifeng pointed out that the system itself has some limitations. It can only timely feedback the correct rate of objective questions, but it can't distinguish the score of subjective questions. It is inconvenient for students to write on the Tablet PC, so teachers can only correct problems on the Tablet PC. Students can't set up a set of wrong questions on the Tablet PC (Liu, H. F., 2018) [9].

3.5 In terms of school funding

Ge Guang mentioned that the cost of teaching with Tablet PC equipment is relatively high. In order to achieve the expected teaching effect, teachers and students are usually required to have one Tablet PC. Schools must be connected via wireless routers. These hardware and software devices require a lot of money. Teachers also need to spend time learning new software technologies and making courseware. In addition electronic products are updated quickly. If the school funds are insufficient, it is difficult to effectively carry out teaching (Ge, G., 2016) [12].

4. Application strategy of tablet PC in middle school mathematics teaching

4.1 Schools should set Up tablet PC related procedures to reduce unnecessary interference

Deng Yuanyuan proposed, on the one hand, the APP program not related to teaching should not be installed in the student's Tablet PC. On the other hand, based on the actual needs of classroom learning, some unnecessary Internet connections and certain applications need block. Method 1: The school's network management settings prevent the student's external network connection, so that students' Tablet PC devices can only use intranet resources. Method 2: You can temporarily disable applications such as Safari through the policy setting of MDM without disconnecting the external network (Deng, Y. Y., 2015) [13]. Chen Cuizhu suggested that many parents and teachers are worried that students will be addicted to video games or use Tablet PC to browse web pages which are not related to learning content. Therefore, it is necessary to restrict students from browsing the network. By this way, the software installed on the Tablet PC is only used for the course teaching and the network only use the campus network. When the students go online, the information viewed can only be the information of the school database (Chen, C. Z., 2012) [5].

4.2 Teachers should choose the content suitable for the teaching of tablet PC

Yang Kun mentioned that not all content is suitable for using the Tablet PC to assist teaching. For example: simple geometric knowledge, although it can also be demonstrated by the teaching software on the Tablet PC, in the specific teaching process, students still need to take the ruler and protractor to draw with their own hands to exercise their hands-on ability (Yang, K., 2012) [3]. Chen Cuizhu suggested that the Tablet PC should be properly cited in the

teaching. In other words, after the introduction of the Tablet PC, not every class must use the Tablet PC and not all content must be presented through the Tablet PC. The introduction of new technologies is to assist teaching, and not to take the lead. Traditional teaching tools still have the value of their existence (Chen, C. Z., 2012) [5].

4.3 Strengthening cooperation and development of tablet PC teaching software

Teaching software is essential in the teaching application of Tablet PC. However, as the demand for teaching changes, there are not many types of teaching software suitable for different students and different schools. Therefore, it is necessary and urgent to develop teaching software that adapts to the actual situation of the school. The development of teaching software is not only a matter of professional technicians or companies. To develop teaching software and teaching content suitable for local school teaching, Tablet PC must be done by professional companies and school teachers. Only teachers can truly understand the actual situation of students and the actual teaching needs. Therefore, professional companies must cooperate with teachers to develop in order to truly meet the teaching needs (Chen, C. Z., 2012) [5].

4.4 Improving the professional literacy of teachers using tablet PC teaching

Schools should regularly conduct Tablet PC teaching skills training to enhance the level of literacy and ability of teachers to use the Tablet PC in classroom teaching. For teachers, you can learn more about the different teaching methods, such as open classes and more observations of other excellent teachers' classrooms. At the same time, schools should give teachers the opportunity to study in other places and absorb the teaching experience of advanced schools (Zhang, T. T., 2017) [14].

4.5 Strengthening the use of teaching resources

Teaching resources are the soul of Tablet PC teaching, so it is especially important to use technology to make good teaching resources. For the math teacher who is just getting started, you can download some ready-made teaching resources on the Internet, such as: Onion mathematics, which contains micro-courses of various versions of textbooks in junior high school. The micro-course language is humorous, easy to understand, and is very popular among junior high school students. For teachers who have been skilled, it is more practical to make teaching resources by themselves, because it is targeted to students (Li, M., 2017) [15].

5. Rational Review

In summary, it can be seen that the current research on the application of Tablet PC in middle school mathematics teaching involves three aspects: application value, deficiency and strategy. For the application value of Tablet PC in middle school mathematics teaching, the previous research has given full affirmation, not only pointing out that Tablet PC can stimulate students' enthusiasm for learning, realize layered teaching, and also improve students' information literacy. For the defects and inadequacies of the application of Tablet PC in middle school mathematics teaching, the predecessors mainly started from several aspects such as student learning, teacher teaching, system itself and school capital investment. As for the application strategies of Tablet PC in middle school mathematics teaching, current researchers pointed out that we should not only set up the relevant procedures of the Tablet PC, select the content suitable for the teaching of the Tablet PC, but also strengthen the use of teaching resources. These strategies are all reasonable.

From the above analysis, it can be seen that although many researchers in China have conducted research on the application of Tablet PC, no research has been done on the relationship between the behavior of teachers when applying Tablet PC and the core literacy of students. We hoped that future researchers will strengthen research in this area, so that the Tablet PC can better improve the core literacy of students and enable students to further develop.

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