

Challenges and Countermeasures of Fragmented Learning to College Mathematics Teaching in the Era of Mobile Internet

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Abstract: The integration of modern information technology and communication technology workers based on the Internet platform into their daily production and life has completely changed the development mode of different industries. At the same time, the field of education is facing an earth shaking change. In the context of the integration of the Internet platform into the education industry, it has also further broken through the limitations of teaching work in terms of time and space, and can realize the expansion and extension of after-school teaching, allowing students to use fragmented time to make learning more efficient. At present, the fragmented teaching mode is also becoming a mainstream form of self-learning. This self-learning mode has greatly mobilized the enthusiasm of students' participation, and has many advantages, such as unlimited time and place, short teaching content, and easy to focus in a short time. It has become a new way for Contemporary College Students to improve their learning efficiency in the context of mobile Internet. However, this fragmented learning mode not only brings convenience to students' learning, but also brings a series of challenges to mathematics teaching in Colleges and universities. Therefore, under the background of opportunities and challenges, how to grasp the fragmented learning form to meet the difficulties and continuously improve the teaching effect of college mathematics has become an important topic that educators should consider. This article mainly analyzes the challenges of fragmented learning for College Mathematics Teaching under the background of mobile Internet, and discusses the coping strategies of College Mathematics for fragmented learning, hoping to provide reference for continuously improving the teaching quality of college mathematics.

1. Introduction

The research on mobile learning began in the 1990s. In China, the research on mobile learning is mainly carried out in the field of distance education. After entering the 21st century, Chinese scholars' research on mobile learning has gradually increased. In terms of the number of documents, there are thousands of documents about mobile learning in China. From the perspective of literature

content, the literature on mobile learning mainly involves the following aspects: first, it discusses the connotation of mobile learning and analyzes its related concepts; The second is to discuss the characteristics, advantages and influencing factors of mobile learning; The third is to analyze the construction of mobile learning environment; The fourth is to study the construction and application of mobile learning resources. From the perspective of literature content, the literature on mobile learning is mainly divided into four aspects: theoretical basis, applied research, related technology and network resources. The research on mobile learning in China has been applied in teaching practice since 2005 and has achieved some results. In recent years, with the rapid development and application of mobile communication technology, mobile learning has gradually attracted the attention of researchers, and a number of mobile learning research results have emerged. Based on the literature review of mobile learning in China, the author found that the current practical research on mobile learning by Chinese scholars mainly focused on the following aspects: the mobile learning mode based on mobile communication technology, the implementation of mobile learning in distance education, the analysis of learners' needs for mobile learning, the problems that should be paid attention to in the process of mobile learning, mobile learning based on mobile phones and other terminal devices, etc[1]. These research results reflect the breadth and depth of Chinese scholars' research in this field.

In the era of mobile Internet, the popularity of smart phones enables people to enjoy the convenience and advantages brought by the Internet anytime and anywhere. Head down screen brushing has become one of the most important ways for people to entertain themselves in their spare time. The application of this screen brushing behavior in the teaching of college mathematics can help students use fragmented time and enable students to obtain new knowledge through intelligent mobile devices anytime and anywhere. This learning mode has many advantages, such as flexible time and space, concise content and easy concentration in a short time. It has become one of the new learning methods widely favored and respected by college students. According to the data survey, more than 85% of the students' online learning time is two hours a day, while 40% of the students in the country often choose to complete relevant learning tasks in different network platforms and communicate with educators and other students. That is to say, the fragmented learning method is becoming the mainstream of learning, the effective expansion and extension of classroom teaching forms, and is also widely recognized and favored by contemporary college students. In recent years, the focus of research on fragmented learning mainly includes the following two aspects: first, analyze the characteristics of fragmented learning in the context of the Internet, and the problems brought about by the current teaching form. For example, some scholars believe that fragmented learning is easy to cause the separation of knowledge, which hinders students from forming a more perfect knowledge framework and system. Some scholars also believe that fragmented learning can easily lead to obstacles in students' cognition of modular knowledge. Second, further explore the optimization and development strategies of fragmented learning forms. In this context, many scholars have proposed the fragmented learning method of "zero deposit and lump sum withdrawal", hoping to reorganize the fragmented knowledge points and help students form a more personalized and systematic knowledge framework through organic integration[2]. This article also discusses the challenges and coping strategies of fragmented learning to the current college mathematics teaching, hoping to transform the advantages of fragmented learning into the power of the current college mathematics teaching.

2. Characteristics of Fragmented Learning

Mobile learning refers to the process of learning on various portable devices using mobile communication technology. This learning method breaks through the time and space limitations of

traditional teaching, and has the characteristics of personalization, openness, collaboration, interactivity and instantaneity. Fragmented learning is a new product in the era of mobile Internet. At present, there is no unified cognition and explanation for this form of learning in the academic community, but some scholars have summarized the characteristics and connotation of fragmented learning. On the one hand, with the rapid development of modern information technology and the gradual integration of cutting-edge science and technology in the field of education, the total amount of knowledge is constantly expanding. Under the background of knowledge explosion, a large amount of knowledge emerges in the form of data information. The organic integration of these knowledge and modern media technology can provide scholars with more diversified learning methods, so that more and more people can use leisure time for fragmented knowledge acquisition. On the other hand, the knowledge absorbed in the fragmented time is extremely scattered, and such knowledge lacks a framework system. Therefore, learners also need to constantly change their way of thinking, be able to transform these fragmented knowledge into meaningful knowledge, and finally realize the internalization and transfer of knowledge through the reorganization of knowledge. The definition of fragmented learning in this article mainly refers to a new type of informal learning method that can make good use of the mobile Internet to acquire fragmentary knowledge in leisure time according to the learning needs of students, and realize the sorting and processing of these fragmentary knowledge points, so as to promote the improvement of personal knowledge structure. At present, under the background of the continuous integration of mobile Internet technology and big data technology into the field of education, massive amounts of data and information fill people's daily life, allowing people to see the shadow of data and information as far as they can see. In addition, the continuous popularization of modern learning tools such as mobile terminals has made the learning forms of college students more rich and diverse. Therefore, the mode of fragmented learning has gradually been valued by college students [3]. It has become the mainstream trend of learning in the context of the Internet, and its characteristics in the development process mainly include the following aspects.

2.1. Fragmentation of Knowledge Content

The fragmentation of content mainly refers to that the knowledge acquired by students is not complete, but is displayed in front of students one after another, and cannot be presented in a systematic learning framework. With the continuous development of modern Internet technology, people have more and more channels to receive data and information in their daily life, which also makes people become the recipients and transmitters of massive data and information. The popularity of a large number of data and information and short video information also makes the transmission of knowledge present a significant fragmentation feature. First, the source of knowledge is fragmented. In the context of the transformation of the development mode of modern society, people's work and way of thinking have also undergone earth shaking changes. People have changed from passive knowledge receivers to information transmitters and even creators. They can share their views on things using the media platform. Therefore, the sources of knowledge received by students are extremely wide, and they can come from any data information creator in the society. Secondly, the fragmentation of knowledge content itself [4]. At present, many online micro lecture videos are extremely short, and in the short videos, only systematic knowledge points can be divided into multiple piecemeal knowledge points, so that students can effectively absorb knowledge in a very short time. Finally, it is the fragmentation of forms. In the context of the popularity of mobile intelligent devices, knowledge learning is no longer the same as in the past, which can only be transmitted and presented through paper media. Instead, it can appear in students' lives in the form of micro lecture video, dithering live broadcast platform and other forms. The

expression of its content is also more vivid and diverse, and has the characteristics of discontinuity in the learning process.

2.2. Fragmentation Characteristics of Learning Forms

Considering that under the background of the current mobile Internet era and the continuous popularity of smart phones, the methods of knowledge presentation and transmission have also undergone earth shaking changes, which has also led to the change of students' learning forms[5]. First of all, the tools used by current college students in the learning process are quite different from the paper-based teaching materials in the past. Students can even get knowledge through e-books, video teaching courses and so on without paper-based teaching materials. Secondly, the differences of learning forms. On the one hand, in the past teaching background, the development of teaching work was often concentrated in the classroom, requiring educators and students to carry out face-to-face teaching and learning activities. In the context of the popularity of mobile Internet technology, the implementation of educational activities can break the limitations of time and space. Through the online and offline integrated curriculum teaching mode, the forms of knowledge transmission are more diversified. Wechat teaching, cloud platform teaching and other forms are also widely used. On the other hand, the traditional education mode is mainly based on the unilateral transmission of educators, while in the fragmented learning mode, students can obtain the necessary resources in the network platform according to their own learning preferences and needs, so as to carry out independent exploration in their spare time.

2.3. Fragmentation of Learning Time and Space

With the accelerating pace of social development, the pace of people's daily life and work is also accelerating, which also makes people busy with work and study all day in their daily life. They can only use fragmented time to carry out spiritual entertainment, and it is difficult to have a complete time to systematically learn knowledge and improve themselves. However, considering the rapid pace of social renewal, if everyone do not pay attention to improving our knowledge structure and improving our skills, they will soon be eliminated by the society. Therefore, in order to adapt to the needs of fast-paced work and life, people can only use their spare time to carry out fragmented learning. In this context, learners do not need to specifically enter the classroom to obtain knowledge [6]. As long as they use mobile devices in the context of Internet coverage, they can learn online. Their learning time and space are extremely flexible and will not be subject to any constraints. For example, in buses, subways and cafes, fragmented time can be used for learning, greatly breaking through the time and space limitations in learning activities.

3. Challenges of Fragmented Learning to College Mathematics Teaching in the Context of Mobile Internet

3.1. Easily Lead to Students' Cognitive Deviation

Fragmented learning mode brings new learning mode to contemporary college students, but it also contains some scattered and incomplete teaching information, which also easily leads to cognitive differences in the process of learning. The source of this cognitive bias problem lies in the students' one-sided impression of false or incomplete mathematical information, which easily leads to students' one-sided cognition of mathematics learning in their minds under the background of unable to fully understand [7]. First of all, fragmented knowledge itself has the characteristics of being extremely one-sided and relatively scattered. In many fragmented micro lecture videos,

considering the short time, only one section of the systematic knowledge can be extracted and presented to students. Such content presentation also increases the risk of students' interrupting chapter meaning in the learning process. Especially considering that college mathematics itself has the characteristics of strong abstraction and systematization, this kind of fragmented construction method taken out of context also easily leads to students' inability to view modular mathematics knowledge from a complete perspective. In addition, the time and place of learning are extremely random, and many students often cannot spend a lot of time and energy to understand the whole picture behind mathematics knowledge, which leads to cognitive bias. Secondly, knowledge transmission in the era of mobile Internet is open and arbitrary, which also makes it difficult for many students to distinguish the authenticity of mathematical knowledge in the network platform without knowing the truth. In the era of the rise of everyone media, people can not only act as the recipients of knowledge, but also become the disseminators and creators of knowledge. Everyone can create and share personal knowledge on the network platform. However, due to the lack of strict audit mechanism, many providers of knowledge may inadvertently transfer incorrect information to the outside world, and these false information will also enter under the cloak of "experts" and "teachers", in the network platform, it is widely spread, which leads to the cognitive deviation of students. For example, during the outbreak of Xinguan pneumonia, the news that Shuanghuanglian oral liquid could prevent disease was widely spread on the platform of dithering and wechat, which also led to people rushing to drugstores to buy, increasing the risk of virus infection in the crowd. Such problems also occur in the process of college mathematics teaching [8]. Many so-called "teachers" pass on their one-sided cognition to students, and students lack the ability to distinguish these incorrect information, which also easily leads to students' cognitive bias of mathematical knowledge in the process of learning. Finally, in the context of the continuous integration of big data technology into the development of different industries, personal learning platforms, in order to attract people's attention, will continue to provide students with some homogeneous mathematical knowledge according to the search frequency and learning preferences of college students, which also leads students to focus more attention on their preferred fields in the process of learning, Thus, the risk of cognitive bias of mathematical knowledge is increased.

3.2. Easily Lead to Fragmentation of Students' Thinking Form

Learning and acquiring scattered knowledge for a long time can also easily lead to students' thinking about things becoming more fragmented, which is not conducive to students' building the framework of thinking learning. Especially for college mathematics courses, the cultivation of students' thinking ability is the most critical teaching goal. It is also a high-level cognitive activity for students to summarize and feedback their mathematical knowledge, which can help students better discover the laws behind mathematical knowledge [9]. The goal of mathematics learning is not only limited to the accumulation of knowledge, but also lies in the construction and transformation of thinking forms, which is also the key entry point to help students improve their professional quality. However, the prerequisite for the construction of benign thinking is to have a complete thinking structure framework. Generally, the richer the mathematical concepts and knowledge students have in their minds, the stronger their ability to understand the same type of mathematical problems, and the higher their thinking construction in the process of thinking. It can be seen that if everyone want to help students build a sound thinking structure framework, they need to enable students to establish a perfect knowledge framework system. However, in the context of long-term fragmented learning, on the one hand, considering the short and fast characteristics of fragmented knowledge, the connection between knowledge is extremely scattered, which also makes it difficult to reconstruct the connection point between different knowledge points,

which is not conducive to students' summary of knowledge and construction of system framework[10]. On the other hand, driven by the mobile Internet technology, many students can easily master scattered and shallow knowledge points in the process of learning, which also leads to the habit of receiving information completely and obtaining information directly without thinking and sorting. The understanding of knowledge always stays at a shallow level, which is not conducive to students' deep mining of the laws behind mathematical knowledge.

3.3. It is Easy to Cause Students' Mathematical Cognitive Overload

While the fragmented learning platform brings massive learning data and resources to students, it may also make students continuously acquire shallow fragmented knowledge, resulting in cognitive overload. According to the research work, in the process of students' cognition of knowledge, certain cognitive resources need to be consumed. However, if the cognitive resources consumed in the process of knowledge acquisition exceed the total load of individual resources, there may be an excessive learning burden caused by insufficient supply of cognitive resources, which is called cognitive overload. With the increasing problem of cognitive overload, students' lack of self-confidence, inability to concentrate, and significantly reduced learning efficiency will also appear in college mathematics learning activities. For example, in cognitive psychology, there is a magical effect called " 7 ± 2 " effect. This effect believes that the total capacity of human memory processing for knowledge in a short time is 7 ± 2 information units. If the information faced by the human brain exceeds this total capacity, it is difficult to realize the effective understanding and deep processing of data information. Therefore, in order to facilitate people's memory, some license plate numbers, emergency public telephones and other information in daily life should be controlled within nine digits as far as possible [11]. Other studies have shown that the construction and presentation of learning information are the key factors leading to the increase of students' cognitive load. In the context of fragmented learning, it is obviously easy for students to be overloaded in the face of massive data knowledge. First of all, the total amount of mathematical knowledge that can be obtained in the open Internet platform is huge, but the quality of these mathematical knowledge cannot be screened one by one. Therefore, students need to spend a lot of time and energy to identify and internalize the knowledge they have learned. Secondly, the reproduction form of fragmented knowledge is loose and casual, which may not be consistent with the cognitive law of students themselves, and it is even easier for some students to increase the difficulty and burden in the process of knowledge processing. When the amount of knowledge and the complexity of knowledge pushed by the network platform exceed the cognitive load of students, students will feel lack of confidence and fatigue in the learning process [12]. Not only that, in the context of massive fragmented knowledge cleaning, as long as you open the mobile platform in daily learning and life, you may see various types of mathematical knowledge, which also easily leads to students' dilemma of knowledge hoarding. That is to say, although students download a large number of learning courses on their mobile phones, they often have difficulties in sorting out and starting. However, students do not have enough time to carry out in-depth sorting of these fragmented knowledge. In the long run, if they cannot digest these knowledge in time, it is easy to cause students' procrastination and other types of learning problems.

4. Effective Countermeasures against Fragmented Learning in the Context of Mobile Internet

It can be seen from the above description that the main problem in the process of fragmented learning comes from the complexity and redundancy of knowledge, and when a large number of knowledge arrive irregularly, the learning pressure faced by students will continue to increase. Therefore, educators should play the role of guides and organizers to lead students to break through

the encirclement and connect the internal laws of these fragmented knowledge [13], So as to help students form a more complete and sound knowledge framework system.

4.1. Building a Systematic Knowledge Framework

In order to build a more systematic knowledge framework system, educators should follow the teaching principle of "zero for the whole" in teaching activities, and be able to collect fragmented mathematical knowledge points to help students realize the construction of mathematical knowledge module mind map. First of all, educators should also advocate that students actively use their spare time to carry out fragmented learning, and increase the amount of knowledge acquisition as much as possible, so as to avoid the phenomenon of "hate less when books are used" in the process of subsequent knowledge framework construction[14]. Secondly, for the fragmented data information that has been collected, the rules and values behind it are mined. By taking its essence, removing its dross, enhancing students' ability to distinguish true and false information, the fragmented information is deeply processed, and the fragmented knowledge obtained can be edited and saved according to the different learning themes and timelines designed by educators. Finally, everyone should regularly carry out classification and integration for the fragmented knowledge existing in the process of mathematics learning. When the scattered knowledge points are effectively linked together, they can realize the construction of the fragmented knowledge structure system through the simplification and classification of massive mathematical knowledge.

For example, educators can recommend students to use knowledge management applications in the mobile Internet platform, such as common cloud note taking programs, which can help students collect fragmented knowledge, realize the processing and in-depth processing of fragmented knowledge, and build a more systematic knowledge framework. This requires educators to be good guides on students' learning path. They can help students summarize fragmented knowledge on a topic in college mathematics learning activities by means of thematic learning modules for students. In the application process, the cloud note platform can realize the processing of cross platform data information, effectively integrate the fragmented knowledge points obtained by students on different platforms, and has extremely strong compatibility [15]. It can summarize and process text and picture information, video and animation information. Through the application of cloud note taking platform, students can centralize the fragmented knowledge obtained from the dithering platform, different learning websites and other platforms through the mode of one key saving, and save and organize it through cloud storage. They can edit and process these data knowledge anytime and anywhere according to the knowledge Title designed by educators. In addition, the cloud note taking platform also has a collaboration function in the operation process, which allows students to build a shared learning network in groups, so that students can modify and edit the knowledge highlights and files that need to be edited in the same network platform, and improve the learning efficiency of students' small group work and team collaboration.

4.2. Mining the Rules of Fragments and Finding the Knowledge Structure

How to present scattered knowledge points in the form of structural modules is of great significance to improve the quality of students' fragmented mathematics learning. The so-called structure of knowledge, in fact, is to let students summarize the tiny mathematical knowledge gradually accumulated, and find the laws behind the same type of mathematical knowledge, so as to use a more orderly arrangement to summarize the mathematical knowledge by categories. If in the process of learning mathematics knowledge, only the fragmented knowledge can be accumulated in the minds of students in a disorderly way, not only can it not play its efficient learning value, but also it may cause students' cognitive overload and other phenomena. However, if students can carry out in-depth processing of fragmented knowledge in a highly hierarchical and regular network structure, they can speed up the retrieval and utilization efficiency of fragmented knowledge in the

subsequent application. Psychologists have found that there are significant differences in the knowledge structure in the minds of many chess players and experts and novices in the field of pilots. In the minds of most experts, professional knowledge is highly organized and structured, and it retains different levels, modules and frameworks. For many novices, although they learn many kinds of knowledge points, there is no effective connection between these knowledge points, so the piecemeal knowledge points have no meaning [16]. It can be seen that if students want to continuously improve the learning effectiveness of mathematical knowledge, they need to integrate these piecemeal knowledge points in a structured way. For example, mind mapping, which is popular in College Mathematics Learning in recent years, can help student's present fragmented knowledge in a structured form, so that students can list knowledge points in a tree or network structure under the same topic, so as to lead students to swim in the deep ocean of thinking.

4.3. Enhancing Students' Initiative to Participate in Fragmented Learning

Fragmented learning itself is an informal form of learning, and its role is to stimulate students' participation and initiative [17]. Therefore, how educators can improve students' enthusiasm and interest in learning fragmented mathematics knowledge after class has also become a major concern. On the one hand, educators should give students a clear goal of learning activities and encourage them to constantly explore the same type of knowledge under the guidance of the goal. On the other hand, students should constantly improve their cognitive initiative and metacognitive ability. This requires students to be able to manage learning activities in a planned way, summarize and reflect on their own learning situation, so as to constantly adjust their own learning rhythm. That is to say, students need to continuously strengthen the consciousness of participating in fragmented learning, and at the same time, they should also carry out tasks in a planned way under the learning objectives given by educators. In addition, the evaluation and feedback mechanism of fragmented learning can be established to enhance students' initiative in participating in fragmented learning. For example, educators can use big data analysis to conduct multi-dimensional analysis of students' online learning time, learning preferences and habits, so as to understand students' achievements in the fragmented learning mode, generate personalized evaluation reports on students' growth, help students feedback on various types of problems existing in the learning process[18], and drive students to participate more enthusiastically in the fragmented learning process, Make the fragmented learning program constructed by students more scientific and reasonable.

5. Conclusions

With the development of modern information technology, mobile learning, as a new learning method, has attracted more and more researchers and practitioners' attention. It breaks through the limitations of time, place and learning methods, and is a deep integration of information technology and education and teaching. With the popularity of mobile devices, mobile learning has also begun to enter people's vision. In developed countries, many researchers have discussed mobile learning, but in China, the relevant research is still in its infancy. Although there have been many research results on mobile learning in China, it still needs to be further improved in theory and practice. To sum up, under the background of mobile Internet, the emergence and integration of fragmented learning mode has brought new opportunities and challenges to college mathematics teaching. Therefore, mathematics educators should take multiple measures, such as leading students to build a mathematical mind map, improving the systematization of fragmented knowledge, and helping students strengthen the subjective initiative of fragmented learning, to truly give play to the application advantages of fragmented learning in college mathematics teaching.

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