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Research on Knowledge Retrieval of Junior Middle School Mathematics Micro-course Based on Knowledge Map

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ABSTRACT
With the arrival of fragmentation era, people's learning methods have changed greatly. Micro-courses have become a very popular learning method for learners, but micro-course are fragmented, which makes it difficult for learners to retrieve the knowledge they need from a large number of learning resources, and the knowledge they learn is scattered and lacking. Without effective organization, it is difficult for learners to learn systematically. As a tool of knowledge management, knowledge map can visually show the location of knowledge points and the relationship between knowledge points. Therefore, this paper puts forward the idea of introducing knowledge map into the junior high school mathematics micro-course resources, constructing the micro-course knowledge retrieval model, it is convenient for learners to find the required knowledge,promoting learners' learning.
Keywords - Knowledge Map,Junior High School Mathematics,Micro-course,Knowledge Retrieval

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I.   INTRODUCTION
With the development of information technology, great changes have taken place in all aspects of people's lives. We have entered an era of fragmentation, and people's learning methods have to change accordingly. As a new form of teaching, micro-lesson has been familiar with more and more teachers. Many micro-course websites have emerged in the market to produce a large number of micro-course videos for learners to use, which makes learners have rich learning resources, and also enables learners to learn what they want to learn at any time and anywhere. Although people acquire more knowledge and more convenient, this does not mean that these fragmented information will be translated into real knowledge of learners. The transformation from external information to internal knowledge needs to undergo an internalization process, and learners still need to learn meaningfully.So how to maximize the role of micro-lessons in the learning process, how to help learners to learn more effectively, especially for middle school students, is a problem we need to face and solve.

The key of Relevant Learning Theory is to connect different types of knowledge nodes and create a learning community network between learners and learning resources, promoting the occurrence of learning significance[1]. Ausubel's meaningful learning emphasizes that learning is the new knowledge represented by symbols, and that it establishes a non-artificial substantive relationship with the existing appropriate concepts in the learner's cognitive structure[2]. Therefore, we can see that the relationship between knowledge is very important. Micro-course is a teaching activity for a certain knowledge point. The relationship between learning resources is not strong. It is difficult for students to study systematically，to search and locate knowledge points. Therefore, this paper considers introducing knowledge map into micro-course to help learners to retrieve the required knowledge more efficiently and accurately in the vast amount of micro-course resources, and establish the relationship between knowledge points, so that students can learn systematically and meaningfully.

II. PROBLEMS AND SOLUTIONS OF MICRO-COURSE
1.   Current problems in Micro-course
Micro-course refers to structured digital resources that use information technology to present fragmented learning content, process and expand materials according to cognitive law[3]. Micro-course, also known as micro-lesson ,micro-class,refers to a video course with clear teaching objectives and themes,short and concise content, which is controlled within 10 minutes[4]. The advantage of

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micro-course is its "micro" rather than "fragmentation".Over-fragmented learning resources are not conducive to students' systematic learning. At present, there are still some problems in the application of micro-courses.

Firstly, there are many websites and platforms for making micro-lessons on the market. The resources of micro-lessons are too complicated, which makes it difficult for learners to quickly and accurately select the appropriate knowledge from the vast resources for their study. Secondly, micro-lessons are developed for each knowledge point, which means that a course may contain hundreds of micro-lesson videos. The website presents learners with an independent knowledge point. There is no corresponding relationship between these knowledge points. This fragmented learning is difficult for learners to learn knowledge systematically. It is also difficult to guide a problem in depth, and it is difficult for learners to construct their own knowledge system.

2. Solutions

In order to solve the above problems, this paper proposes to introduce knowledge map into knowledge retrieval of micro-course, construct a knowledge retrieval model based on knowledge map, and use knowledge map to organize knowledge points effectively and visually present their relationships. When learners want to search for a knowledge point, they can find the knowledge they need more quickly and efficiently, and visually present the knowledge that is related to other knowledge points, help learners to understand and master the knowledge point better, and integrate the knowledge they have learned, so that they can enter into the learning process to do meaningful learning.
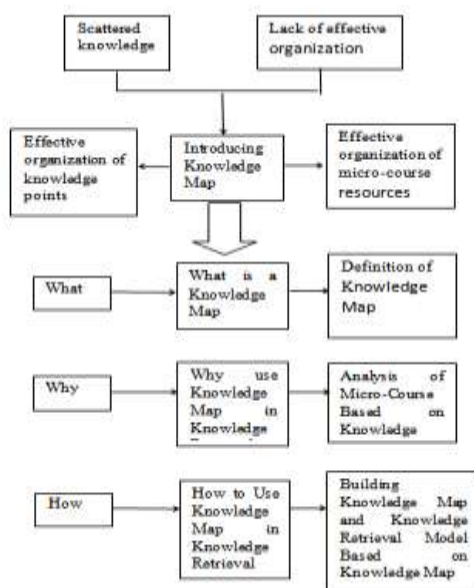

Fig1: A solution based on Knowledge Map

III. DEFINITION AND CONSTRUCTION OF KNOWLEDGE MAP

Knowledge map, also known as cognitive map, concept map and cognitive map, is a knowledge management tool with navigation function. It usually describes knowledge and its relationship [5]. Knowledge maps are currently used in many disciplines, such as information science, management and education. The concept of knowledge map was first put forward by Brooks, a British intelligence scientist. It was mainly used to analyze the logic of literature content. Since Brooks, many scholars have begun to define knowledge map from different perspectives. In this paper, knowledge map will be used as a knowledge guide, indicating the location of knowledge, showing the interrelationship between knowledge, so that learners can quickly find the knowledge they need ,promoting the systematic knowledge construction of learners.

There are many methods to construct knowledge map, such as three-step construction, four-step construction, five-step construction, six-step construction, etc.Although there are many construction methods, the key steps are the same: identifying knowledge points, establishing the relationship between knowledge, designing knowledge maps and realizing the dynamic updating of knowledge maps.

The construction of knowledge maps in micro-courses should follow the following principles: learner-oriented; design and build around the theme; select a part of relatively important knowledge as the basis for mapping; design a dynamic and expandable knowledge map to update students' learning progress in real time, and teachers can adjust to the volume is in real time according to feedback on the course.

IV. THE APPLICATION OF KNOW-LEDGE MAP IN MICRO-COURSE KNOWLEDGE RETRIEVAL

Using knowledge map to organize micro-lesson learning resources can clearly show the internal relationship between knowledge points and knowledge points, so that learners can understand the overall knowledge structure stereoscopically, intuitively and clearly, and judge the correlation and correlation degree between knowledge points by the length and thickness of the links between knowledge nodes. Knowledge map can provide the function of searching, navigating and locating knowledge points for micro-courses, so that learners can quickly and accurately retrieve the required knowledge, and other learning contents related to knowledge points can be found according to graphics. Therefore, according to the theory of knowledge map and knowledge retrieval, this study constructs a

knowledge retrieval model based on knowledge map, as shown in Fig 2.
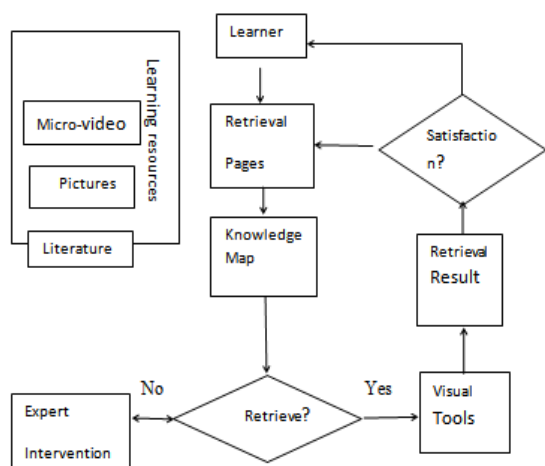

Fig 2: Flow chart of knowledge retrieval based on Knowledge Map

The retrieval process: 1) When the learner sends out the retrieval request, the retrieval request is transmitted to the knowledge map. The knowledge map filters the keywords in the retrieval request, transforms the keywords into the semantic format through the knowledge map, and finds the knowledge resources matching the keywords and feeds them back to the learners in the form of graphics. Learners can find the required knowledge according to the nodes in the knowledge map. 2) If the required knowledge is not retrieved in the knowledge map, learners can contact relevant experts to intervene. Experts will combine their tacit knowledge according to the knowledge map and transform tacit knowledge into explicit knowledge that can be retrieved by learners. 3) The learners can choose the retrieval results. If they are not satisfied with the retrieval results, they can return to the knowledge map and continue to search to find the satisfactory retrieval results for the learners.

V.   APPLICATION OF MATHEMATICS KNOW-LEDGE MAP IN JUNIOR MIDDLE SCHOOL

Mathematics, as a subject with strong logic, has its own hierarchical structure. Knowledge points need a team of experts in the field of knowledge to assist the course teachers to study the course together and extract them. They can refer to the chapters, sections and knowledge points of the textbook to extract concepts. At the same time, they can fully grasp the positioning of each knowledge point in the whole curriculum system and the relationship between each knowledge point [6].
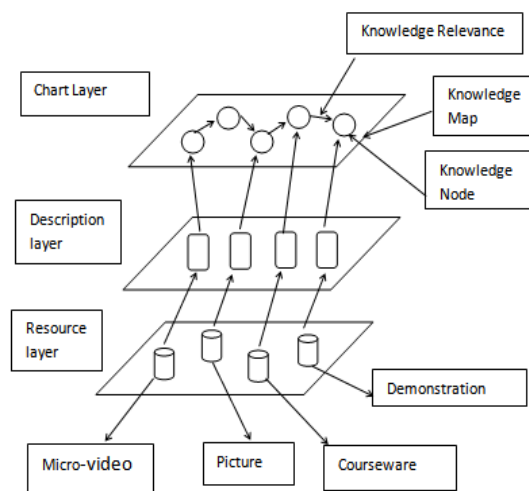
Fig3:Knowledge Map Model of Mathematics Micro-Course in Junior Middle School

1) Organizational presentation of knowledge points

According to the order of chapters, sections and knowledge points in textbooks, the knowledge points of junior middle school mathematics are displayed through knowledge maps. Each knowledge node corresponds to a junior middle school mathematics knowledge point. The length and thickness of the connection between the nodes indicate the degree of association among the knowledge points.If the connection between the two knowledge points is short and relatively thick, showing that there is a high degree of correlation between the two knowledge points. In addition, we need to design'+'to expand knowledge points so that learners can learn more deeply.

2) Specific description of knowledge points

Knowledge maps should be able to display detailed information about knowledge points. That is to say, when the learner hovers over a knowledge point, it can automatically display the detailed attributes (definition, keyword, importance) of the knowledge point. The learner can search the required detailed knowledge according to the keyword location.

3) Linkages between knowledge points

As far as mathematics is concerned, the connection between knowledge points is usually a bridge-like formula or some kind of thought (e.g., transformation thought, equation thought, etc.). As long as we understand and grasp the intrinsic structure and connection of knowledge points in essence, we can connect all knowledge points in series and learn more. Knowledge maps can be roughly divided into four relationships: inclusion, type, precursor and association. For example, the knowledge point of the first mathematics in junior high school is "one-dimensional equation", which is the basis of students' learning equation. In the future, the binary primary equation and binary primary equation system, the ternary primary equation and

the unitary quadratic equation must be reduced to "one-dimensional equation" to solve, so the "one-dimensional first equation" belongs to the category of "one-dimensional first equation". Precursor knowledge points are the basis of learners' follow-up learning.

4) Sources and detailed explanations of knowledge points

The knowledge map should contain the source of knowledge points and other learning resources. When learners encounter knowledge points they do not understand or want to further study the knowledge points, they can click on the quick access to learning.

For teachers, knowledge maps can be used to assess learners' knowledge and to view learners' learning progress in real time, so that teachers can judge learners' learning situation. When a teacher finds that a learner has made a mistake in a certain knowledge point, the teacher can find the precursor knowledge points that the learner did not grasp before accurately and quickly according to the knowledge map. According to the feedback, the teacher can give guidance to the learner, which will greatly improve the teaching efficiency of the teacher. Teachers can also use knowledge maps to recommend to learners that they should supplement their knowledge points in the next step.

VI. CONCLUSION

With the wireless network sweeping through human daily production and life, the popularity of mobile terminals and civilian applications, traditional education and teaching methods ushered in the revolution of fragmented learning [7]. People's learning style is becoming more and more fragmented, but fragmentation like micro-class is not conducive to students' systematic and in-depth learning. This paper mainly studies knowledge retrieval based on knowledge map. By constructing knowledge map, junior middle school mathematics knowledge points can be visualized graphically, and a knowledge retrieval model based on knowledge map is established. The knowledge points retrieved can be presented clearly and intuitively, so as to improve the accuracy of knowledge retrieval. Rate and recall rate. Through the information on the map, learners or teachers can quickly understand the learners' mastery of the knowledge structure system, and help teachers and learners effectively solve the problems in teaching and learning [8].

The main advantage of this study is that it can enable learners to quickly retrieve knowledge, understand the structure of knowledge and its internal links, make seemingly unrelated knowledge logical and orderly, and also enable teachers to understand students 'knowledge comprehensively and intuitively. But this paper puts forward the application model of knowledge map in micro-course knowledge retrieval and the structure map of knowledge map system in theory. In practice, there are still many problems to be solved, such as the automatic construction of knowledge map. Therefore, to grasp the granularity of knowledge and construct a reasonable knowledge map are still worthy of our study.

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