

Research on the Application of Knowledge Visualization in Information Technology Curriculum

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Abstract: the purpose of this study is to make clear how to apply the knowledge visualization tool into information technology teaching in primary and secondary schools, so as to actively play its application value. Firstly, the connotation of knowledge visualization and the characteristics of the information technology curriculum in primary and secondary schools are analyzed. Based on this, the connection between the two is analyzed as well. Visualization tools of knowledge include table, flow chart, mind map, concept map, etc. This paper combines these tools to design the corresponding examples of application of information technology teaching, so as to carry out a more in-depth analysis and summary.

The Connotation and Essence of Knowledge Visualization

The Connotation of Knowledge Visualization. Knowledge visualization, as a kind of "knowledge representation", specifically refers to the fact that knowledge has an external pattern of manifestation, and it transmits knowledge through the use of diagrams. By using knowledge visualization, the knowledge can be constantly acquired, internalized, transformed, exchanged, applied, spread and innovated. Knowledge visualization can be presented in the form of diagram, including graph, matrix, concept map, and knowledge map and so on. It has its own range of application, including the transmission of factual knowledge and that of thoughts, attitudes, experiences, expectations, values, opinions and predictions, etc. In terms of production method, it includes freehand sketching and computer software drawing [1].

The Essence of Knowledge Visualization. To analyze knowledge visualization from the essence, namely to represent individual knowledge of people by graphical means to form a kind of external form, it can play a role in the aspect of the sensory knowledge of human, achieving the dissemination and innovation of knowledge. For teachers, in order to better explain the knowledge relevant to information technology to students, they often utilize the knowledge visualization tool. Based on this, the abstract concept can be transformed into explicit external forms, and in this way, it is easy for students to get knowledge in the classroom, and to improve their level of applying knowledge.

The Characteristics of Information Technology Courses in Primary and Secondary Schools As Well As the Connection with Knowledge Visualization

Characteristics of Information Technology Courses in Primary and Secondary Schools. (a) Developmental characteristics. For the course of information technology in primary and secondary schools, it embodies the development characteristics of the times in the teaching process. This is resulted from the development of modern information technology, active use of hardware and

software, as well as the emergence of many new areas and new ideas. With the constant development of information technology, the knowledge visualization tool is generated.

(b) Comprehensive characteristics. In the information technology curriculum of primary and secondary schools, it includes the contents of many disciplines, and as a basic science, it reflects the feature of comprehensiveness. In the implementation of modern information technology education, multimedia is used frequently and widely. At the same time, higher requirements are proposed as well, namely to complete the teaching information through hypertext, so the use of the knowledge visualization tool is advocated in the teaching of information technology course in primary and secondary schools.

(c) Instrumental features. In addition to the above characteristics, for the information technology curriculum of primary and secondary school, its subject reflects instrumental characteristics, which is not a general tool but "a universal human intelligence tool". With the development of the information explosion era, the knowledge visualization tool is generated. In other words, the teaching based on information technology curriculum can make students better grasp and apply the computer because it is the advanced tool of this era, and can let the students know how to use computer to develop their intelligence and cultivate their creative ability. For example, students can use the visualization tool in making their own curriculum or transcripts [2].

(d) Practical features. The information technology curriculum of primary and secondary schools reflects practical features, so in order to better create and develop it, computer operation is often needed to complete actively. For practical operation of computers, also known as the experimental operation, it is related to the information technology curriculum of primary and secondary schools, especially in the aspect of the teaching level and developmental level. As a result, teachers should pay attention to the actual teaching process. For example, in computer experiment, teachers should manage this link well and constantly improve the enthusiasm of students, and at the same time, in the experimental operation, they should let the students actively participate in it to possess a better understanding of the knowledge and complete classroom tasks successfully. Consequently, the application of knowledge visualization tools can solve this problem.

The Relationship between the Information Technology Curriculum in Primary and Secondary Schools and Knowledge Visualization. Through the analysis, it can be found that the information technology curriculum in primary and secondary schools characterized by development ability, comprehensiveness, instrumentality and interestingness, has great practicality. In this way, the teaching of this course should mainly base on practical operation, which requires teachers to present briefly and succinctly and students to practice more. As for "intensive teaching", teachers can present the basic and the most essential part of the contents, whereas teaching is also an art, so teachers should actively use knowledge visualization tools to achieve this goal. In contrast, as for "practice more", students need to actively participate in computer operation in which they can apply the knowledge and methods they learned to the operation. In fact, through the knowledge visualization tools, this goal can be achieved.

Introduction of Common Knowledge Visualization Tools

Knowledge visualization tools include many types, such as the flow chart, concept map, map of the thinking, cognitive map, semantic network, knowledge map and table and so on. While in the application of knowledge visualization tool, it is needed to comply with some basic principles, including: focusing on bigger, working in small, being popular and easy to understand, possessing both texts and pictures, human machine cooperation and being simple and practical. Knowledge visualization tends to fit in the information technology curriculum of primary and secondary school,

and the specific case analysis is as follows.

To Guide Students to Use the Form to Make a Curriculum Schedule. We often use a type of graphic tool, namely the table. Although it is very simple, its function is great. It has been widely applied in many subjects, such as the courses of Chinese, English, science, mathematics, physics, information technology and so on. In the classroom teaching of information technology, teachers use the knowledge visualization tool to guide the students to make their own weekly curriculum schedule.

To Show the Order by Using the Flow Chart. The flow chart includes the frame and the flow line. The frame describes the type of every kind of operation, and the operation content is presented by the text and symbols in the frame. As for the order of operation, it is represented by the flow line. By using the flow chart, the visual effect perceived by people can be improved, which is conducive to students' understanding of knowledge. The flow chart has various shapes, such as the rectangle, round, triangle, and so on, and these shapes are always connected together by an arrow to form an operative procedure. In the process of teaching, teachers can illustrate the teaching content and the solution process more clearly through the use of a flow chart. At the same time, by requiring the students to draw the flow chart by themselves, teachers can help to improve students' ability to think and solve problems [3].

To Organize Related Topics by Using Mind Mapping. The so-called mind map, as a kind of thinking "map", is used in the aspects of memory, learning and thinking, which inspires people to think continuously. It can also be applied as a method of knowledge visualization in teaching. The ultimate knowledge structure of mind map mainly based on divergent thinking has mesh characteristics. In a mind map, the central theme is concentrated in the middle, and on this basis, other knowledge points are generated continuously. The expressive techniques of the mind map include texts, pictures, and hyperlinks. In addition, in order to enhance the effect, the color and font can also be utilized to modify it, so as to enhance its interest and improve the students' creativity and memory.

The Application of Mind Mapping in Information Technology Curriculum in Primary and Secondary Schools

The Teaching of New Courses. Teachers can pay attention to some aspects by surfing the internet, such as the domain name, the setting of TCP/IP and so on. In addition, teachers demonstrate how to open a web browser by combining teaching media such as Power Point, web course-ware, etc., and how to enter the URL in the address bar, and then let the student log in the webpage. After this, teachers require the students to complete some simple click or browse operations. When students have questions in the class, the teacher should answer as soon as possible.

Students' Practical Operation. When the students have understood what the teacher said, they begin to operate on the Internet by themselves. At this time, the teacher should grasp the situation of each student in a timely manner, and once the students encounter problems, teachers should offer timely help.

Summaries of the Teacher. Based on the problems proposed by students in operating the internet, teachers should make a summary in a timely manner. In particular, they should analyze what students are interested in, as showed in Fig. 1.

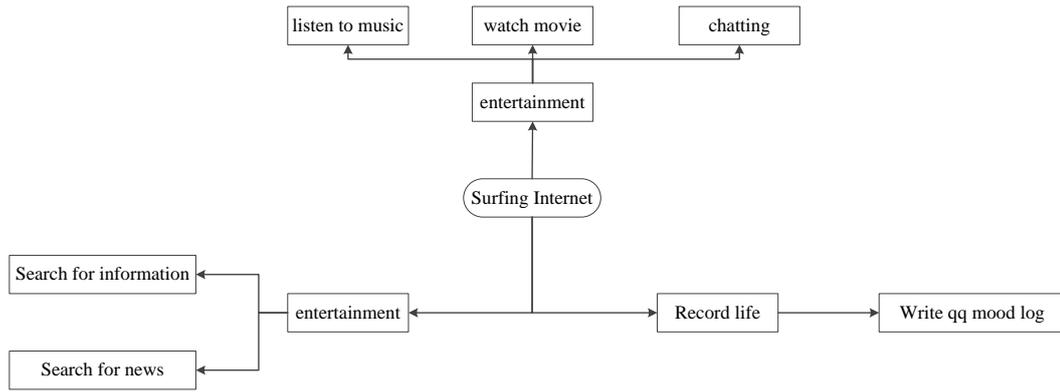


Figure 1. The mind map after the improvement of the students

Based on this, teachers continue to guide students, making them learn better with the use of network. For example, courseware downloading, teachers can introduce downloadable software to the students, such as thunder, and ask the students to use the software to complete the search, downloading and so on, as shown in Fig. 2.

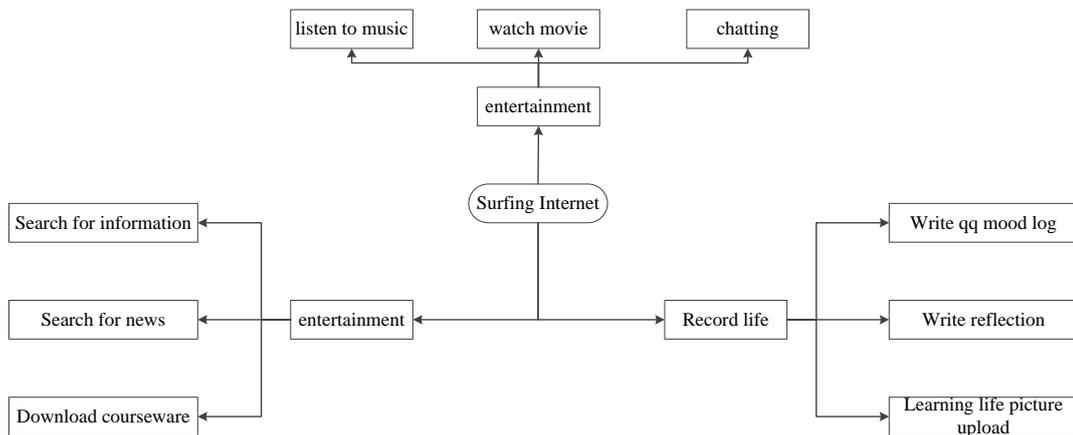


Figure 2. The mind map after teachers' guidance

In a word, in the process of teaching information technology in primary and secondary schools, teachers can fully utilize knowledge visualization to realize aided teaching, especially for the basic knowledge that is hard to understand and the course content that cannot be understood by students. Through the knowledge visualization tool, the optimization of teaching can be realized. In the course of information technology, when students encounter the concept or computer operation which is not easy to understand, teachers can promote the understanding of students and improve the teaching effect through the knowledge visualization tool.

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