The Development and Application of Multimedia Software in Cartography Education

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Abstract

This article sets forth the necessity of developing a series of multimedia software of cartography teaching. We present a multimedia electronic teaching material *Walking in Cartography* as an example, to discuss the characteristics and methods of developing a series of multimedia software of cartography teaching. We put emphasis on the properties of developing the multimedia electronic teaching material *Walking in Cartography* and the rules of designing its page frame. That is, how to use multimedia properly to represent teaching contents, to embody teaching thoughts and to reach teaching objectives according to teaching rules and learner's cognitive mentality as well as the rule of memory. Finally, we introduce the application features of the series of multimedia electronic teaching software *Walking in Cartography*.

1. Foreword

With the advance of science and technology, man has stepped in society of information. The evolution of computer technology and network communication, especially the rapid developing of multimedia technology and the popularity of Internet in the whole world, have greatly changed man's production mode, working and studying way, as well as life style. In order to comply with the development of new technology and develop new types of qualified scientists and technicians in mapping area for the 21st century, we must renew training procedures and teaching modes. Among these, the improvement of teaching means will greatly increase the efficiency of teaching and studying. In the past time, students in schools acquired knowledge from teaching materials and classroom instructions. It had some shortcomings such as dull contents, bad visual specialty, and etc. So it could not improve the students' interest and enthusiasm for their studying. The introducing of multimedia to teaching had brought about an unprecedented revolution in educational circles.

Cartography education, as a fundamental subject delving into space information, is also facing with new challenge. The traditional teaching contents and teaching means cannot meet the requirements of the development of modern education. On one hand, the characteristic of cartography education is that it cannot work without maps, especially color maps. Courses and students' self-taught should be supplemented with color maps, especially in the course of *map color design* and *thematic map design*. But generally there is not enough color maps in textbook. On the

other hand, with the development of new technology and the advent of the era of digital maps, contents of cartography become richer and the ties with computer becomes closer. For example, electronic map design, digital map production and publishing, cartography and GIS, cartography and virtual technology, etc. Multimedia technology can make them more visual and vivid.

In a word, proceeding from the considerations of teaching programme of cartography and its characteristics; and making good use of the technology of computers dealing with graphics and images and its colorful systems, we developed a series of practice software *Walking in Cartography* and was used widely.

2．The development of multimedia electronic teaching materials *Walking in Cartography*

2.1 **The characteristics of the development of multimedia electronic teaching materials of *Walking in Cartography***

The multimedia electronic teaching material is made up of pictures, texts, sounds and images. So it can provide students with the studying environment where they can see and hear, and it can improve the enthusiasm and efficiency of the studying efficiently. In addition, multimedia electronic teaching materials make good use of multimedia alteration and let students attach themselves to the teaching really, and became its main body so as to exert student's ability furthest. According to the characteristics of multimedia electronic teaching books, we have developed multimedia electronic teaching materials of *Walking in cartography*. Its main properties are as followings:

2.1.1 The whole structure is rational and its contents are practical.

The multimedia subject is different from the traditional programmer designing. It needs to contact with several media. So it is especially important to verify the structure of information and the whole position. The multimedia electronic teaching material of *Walking in cartography* uses the method of the modularize designing and separates all teaching contents into seven chapters. They are maps and cartography, map mathematical base, map language, mapping generalization, general-purpose map expression, thematic map expression and cartography contents in the times of information. Every chapter is made into a model that can be displayed independently. At last, we design a managing module, by which students can cut and change rapidly between two modules. But without the managing module, the jumping to play also can be carried out between two modules. In every chapter, the designing of jumping relations between two parts is on the basis of the principle that we not only can find the teaching contents rapidly and exactly, but also can understand the administrative levels of the contents and their relations. The contents of multimedia electronic teaching materials of *Walking in Cartography* are in the light of the teaching programme of *Cartography* and refer to a plenty of datum, and then are complied. It tells about map's basic knowledge, basic theory and basic technology. At the same time, it pays attention on introducing new pulse, new technology and new knowledge of the development of cartography.

2.1.2 Its script designing accords with the rules of cartography teaching

Its script designing is to arrange teaching contents on paper. The script of the electronic teaching material is complied by the teachers with rich teaching experience. What is more, it is modified and discussed again and again. The multimedia electronic teaching material should not be the electronic edition of book contents, but the detailed representation of cartography teaching rules and methods. An experienced teacher can use these methods, such as writing on blackboard, prelecting, heuristic question and every kind of useable mediums gestures, expression and so on, to make the teaching in class become vivid and dramatic. Multimedia electronic teaching materials can simulate teachers with rich teaching experience, apply with mediums correctly, arrange teaching contents and teaching movements carefully, and make itself embody experiences of teachers.

2.1.3 The designing of the whole layout is practical and harmonious in color.

Graphic 1

The electronic teaching material is a kind of view product. Whether its whole image designing is slink or not, which will affect the transmitting of product straightly. Only there are pure unite of forms and contents, there are good products. In order to improve the embodying ability of electronic teaching materials and the transmission ability of information. We have concentrated our efforts on the designing of the whole page frame. On one hand, we deal with maps and look on all kinds of special effects as the background of every chapter, which makes electronic teaching materials of *Walking in cartography* have united styles and embody the characteristics of maps. On the other hand, every chapter has a basic tinge, such as orchid, pea green, maple and so on, which is not only rich of varieties, but also looks slink and harmonious. It is shown as graphic 1. The whole designing of electronic teaching materials of *Walking in cartography* include the united harmony of some designing as follows: the designing of buttons, the designing of mouse's variety, the designing of titles, the designing of the text font, the designing of sound effects, and etc.

2.1.4 Use green software which operations are easy and convent.

In process of making electronic teaching materials of *Walking in Cartography*, it uses a plenty of graphics, the manage software of images, two-dimensional and three-dimensional animation software, and sound edition software. For example, PHOTOSHOP, CORLDROW, FLASH, 3DMAX, COOLEDIT, and etc. These software cooperate each other and finish making all kinds of mediums,

which provides the technology support for expressing the contents of cartography and makes software have not only pictures but also letters, and makes software not only be able to be seen, but also to be listened. Among them, those operation files developed with MMB, whose spaces are small, and the CD made with MMB need not installing. This kind of CD is the fluent green software at present. In addition, the electronic teaching material of *Walking in cartography* has the flow designing individualized and easy operation, which accords with the man's cognitive mentality and memory rules.

2.2 **The designing of the paper frame of the multimedia electronic teaching material of *Walking in Cartography***

That the multimedia electronic teaching material carries out the central task is to design the page frame. The designing of paper frame not only piles up text, graphics, image, video, animation and sound together at random, but also makes good use of mediums to show the contents of courses, teaching rules, teaching experience, cognitive mentality and memory rules during studying. A good designing of page frame shows great important functions to enthusiasm of students of using electronic teaching materials and exchanging information with computers efficiently. The designing of page frame of electronic teaching materials of *Walking in cartography* emphasizes on thinking over the contents of several aspects as follows:

2.2.1 In order to exert multimedia visualize character, we should try our bests to use visual information to describe the contents of courses, such as sound, animation, image, graphic, picture, vide. And to carry out many kinds of information synchronous going on, so as to avoid the pure style of the designing of paper frame. If the electronic teaching material moves book contents to the screen mechanically, the electronic teaching material will lose its own meanings.
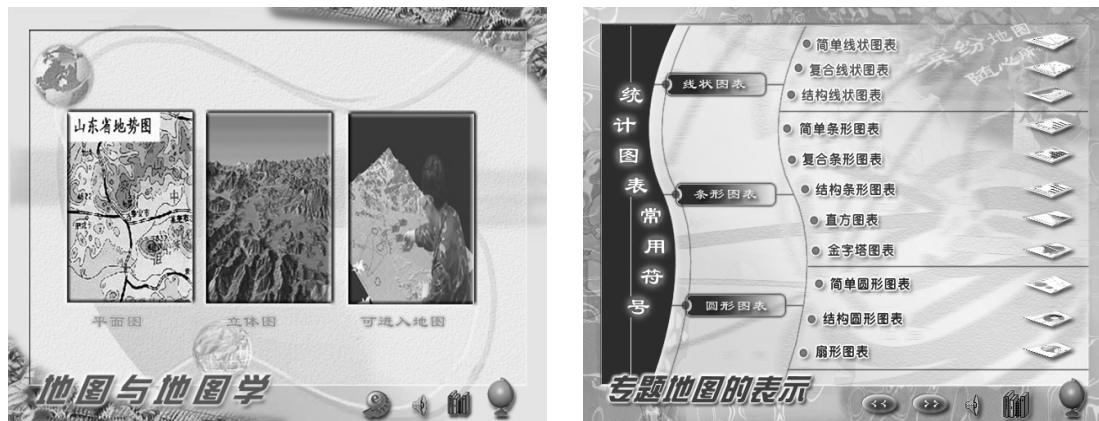
2.2.2 According to cartography teaching characteristics and make good use of map's pictures to explain basic knowledge, which can receive good effects. Among a plenty of designing of paper frame, such as the characteristics of thematic maps, the conception of mapping generalization, the definition of maps, the color of maps, and etc. They are mainly on the basis of maps.

2.2.3 Make good use of animations to explain basic theories in the light of cartography teaching experiences. The animation of good quality is an efficient method in which we explain some pure theories and it is an efficient method in process of things coming to being. Because the animation has some assimilate virtues but any means of medium does not have. It is visualize, vivid, visual and easy to be accepted by the man. For example, to explain map projection, the application of scales, the method of mapping generalization, local-relief method, additive color method, subtractive color method, the method of computes assistant mapping, and etc. We need to use many two-dimensional and three-dimensional animations. For instance, when explaining the basic methods of mapping generalization, the multimedia electronic teaching material does not display straightly graphics before generalization or after generalization, but to use animations to make students feel as the teacher is as drawing as explaining. The whole process is clear at a glance and easy to be understood.

2.2.4 According to the rules of the man's memory, make good use of slicker, color, heat word, and animations to stand out studying emphases and build up memory. For instance, the kinds of map notes, how to show the geographical coordinate on large scales maps, how to show the traffic nets on maps. The process of using the technology of flicker to simulate teachers to explain the sample maps is vivid, visual and easy to be understood. What is more, its definition explanation uses the style of heat words, which is clear at a glance. So the collection of images and letters helps people to understand and builds up their memories. The whole paper frame is vivid and noticeable.

2.2.5 According to the man's cognitive mentality, make good use of multimedia alternation to inspire the initiative studying of students The multimedia electronic teaching material should use its attention to represent heuristic teaching thoughts. The alternation of multimedia electronic teaching materials is not only the different point of making electronic teaching materials, but also the symbol to show its high level. The application of multimedia alteration should be enhanced not only in the exercises of electronic teaching materials, but also in the explanations of electronic teaching contents. For instance, in *Walking in cartography*, we can use multimedia alteration to explain some new knowledge or abstract concept, for example, the explanation of the cognitive function of maps.

2.2.6 In order to inspire the studying interests of students and improve the using effects of electronic teaching materials, the designing of page frame must be artistic and easy on the eyes. We use the elements of designing neatly, such as lines (beeline, folded, line, curve), graphics (circle, rectangle, echelon), color, animation, and etc. According to vary, unity, contrast, proportionality, scale, proportion and repetition, we design the contents of page frame and express teaching thoughts. It is shown as graphic 2.

Graphic 2

3．The development of the sample map collection and practice software of electronic teaching of *Walking in Cartography*

3.1 The development of the sample map collection of *Walking in Cartography*

In order to accord with the flexible teaching methods that is to teaching methods that is to each

students in accordance with a class and with a person, to counter the characteristics of teaching of *Cartography* and the rules of teaching in class. And at the guidance of the thoughts that is to take the fixed to deal with all kinds of varies, we have developed the sample map collection of electronic teaching of *Walking in cartography*, which can be used by different teachers. At first, we separate the contents of the teaching contents into different kinds according as different thematic. For example, the kinds of maps, the expression of general-purpose maps, the expression of thematic maps, the designing of map's color, the designing of sample maps, and etc. Then we collect a plenty of typical sample maps in the light of different thematic, and then we use VB to work out the sample collection system of electronic teaching collection. This system has many operation functions, such as selecting thematic pictures, discussing and explaining maps, modifying, shortening rambling, adding, deleting, and so on. The contents of the system are full and the datum of the system is new, and it is easy to be operated and renovated. Especially it applies to classroom teaching and it can improve the quality of classroom teaching.

3.2 The development of *Walking in Cartography* series of practice software

Practice is the bridge through which knowledge turns to ability. One of the teaching characteristics of *Cartography* is to enhance practice teaching. In the past time, on one hand, it emphasized the basic practice of mapping by hand. On the other hand, both work by hand and paper maps are the main subject. With the development of the technology of computers and digital maps, some of the past contents have been update and some can be omitted. It is necessary to renew the traditional teaching contents and draft normal practice projects of cartography again.

Now, from collecting maps to editing and publishing maps, the whole process is based on digital maps, and looks on computers as a kind of tool. So we must enhance the practice of the designing of maps under computers. We should extract time which is spent on the normal work and add some practice projects on researching, carry out the 'opened' and 'research' teaching, give a certain time to students to think, to practice, to research, and to come to a conclusion. So the practice teaching should add some research practice projects to let students carry out the practice in the method of acting on their owns.

By now we have finished *System of Reading Map and Discussing Map Practice*, *System of Map's Whole Designing*, *System of Map's Visual Layers Practice* and *System of Color Practice*. We are doing some studying and practicing about them in the methods of reading maps, compiling programmes and using them. Every system has its own characteristics. Some systems provide a plenty of maps whose designing are excellent and a plenty of maps whose designing have obvious defaults so as to improve student's ability of reading maps and discussing maps. Some systems need to carry out their functions by compiling programmes. Some systems are to understand the characteristics and the theories of computer drawing maps by using software. These characteristics can greatly improve the studying interests of students and the ability of mapping with computers so as to comply to the development of the digital mapping.

4.The application of multimedia teaching software of cartography in

cartography education

The multimedia teaching software of *Walking in cartography* has rich maps, vivid animations, excellent music, harmonious colors and practical functions. It not only can settle for the requirements of the teaching revolution of schools and improve the efficiency of teaching and studying, but also can enlarge the objects of teaching without the limits of time, place and study-rule, and show great functions in continuous education. The multimedia electronic teaching material of *Walking in Cartography* has been used in cartography teaching in some institutes. By using it, we have got several points of thoughts as follows:

4.1 The multimedia electronic material of *Walking in Cartography* is especially fit to learn by oneself, and the preview and review in the whole process. It can exert the initiative studying of students greatly and shorten the time of teaching.

4.2 The multimedia electronic teaching material of *Walking in Cartography* is easy to be understood, and its designing is beautiful. It is a good electronic reading book about map. It can provide the learners who are short of teachers good studying environment.

4.3 The multimedia electronic teaching material of *Walking in Cartography* can be looked on as a reference teaching material of studying the knowledge of maps by some specialties, such as survey and drawing specialty, geological specialty, geographical specialty, and etc.

4.4 The sample map collections of electronic teaching of *Walking in Cartography* have a plenty of rich datum of maps and the detailed kinds of maps. It is especially fit for teaching important contents in class, and it can make teaching important more neat, vivid and visual so as to improve the quality of teaching greatly.

4.5 *Walking in Cartography* series of practice software enhances the link of teaching practice of cartography. By using multimedia technology and reading maps and designing maps with computers, students can enlarge their fields of vision and pile up experiences, which is helpful for improving the level of the designing of students and the ability of reading map.