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Research Article

Teaching Innovation Methods of Computer-assisted Geographic Information Technology*

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Abstract

With the continuous development of computer and network technology, computer-assisted technology has penetrated into all aspects of teaching, which has brought about fundamental changes in teaching ideas, teaching concepts and teaching methods. This paper studies the computer-assisted innovative teaching methods of geographic information technology. The questionnaire survey method is used to investigate the current status of computer-assisted geographic information technology from the aspects of usage and influence. The comparative analysis of the teaching practice between Powerpoint and GIS-assisted geographic information technology shows that college teachers are holding an affirmative and supportive attitude towards computer-assisted geographic information teaching and the computer-assisted geographic information teaching is superior to traditional teaching methods. Teachers should use computer-assisted technology reasonably in the teaching process and adopt the classroom teaching, autonomous learning and group collaborative teaching integrated with geographic information technology teaching. This research enriches the theoretical achievements of computer-assisted geographic information technology teaching and is of certain guiding significance for the teaching practice of geographic information technology in colleges and universities.

Keywords

Computer-Assisted • Geographic Information Technology Teaching • Powerpoint • GIS • Countermeasures and Suggestions

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In recent years, with the continuous development of the national economy and surveying and mapping geographic information industry, the role of geographic information technology in various fields such as transportation and environment has become increasingly prominent. The demand for geographic information technology talents has also increased year by year (Krieger, 1993). In this context, many universities have set up geographic information technology majors such as photogrammetry and remote sensing, cartography and geographic information system. Also, geographic information technology courses have been set up in many majors (such as urban planning and transportation). However, the focus of relevant scholars and teachers is how to effectively improve the teaching quality of geographic information technology with resources.

Geographic information technology plays an important role in earth science, which is characterized by wide application fields, strong practicality and large number of knowledge points (Riner, Cunningham & Johnson, 2010). At present, colleges of science and engineering and comprehensive universities have established the geographic information technology major and related courses. Due to different competence levels of students, their understanding and acceptance of knowledge are different. In addition, there are problems such as insufficient teaching resources, single teaching methods, unbalanced development between traditional teaching and discipline in the teaching of geographic information technology (Fisher & Toepfer, 1998) so that the teaching effectiveness is poor in this subject. The development of computer technology, especially Internet technology, has opened up new possibilities for the teaching of geographic information technology. As early as the early 1960s, people began to introduce computer technology into education (Crawford, Crews-Meyer & Walsh, 1999). By the early 1980s, computer-assisted technology has penetrated into all aspects of teaching (Chuvieco et al., 2010). Due to the certain gap between technology and basic conditions in China and foreign countries, the computer-assisted teaching started relatively late. In the mid-to-late 1980s, the computer-assisted teaching technology was flourishing in China and the implementation of computer-assisted teaching was regarded as an index in school evaluation (Hess, Rubin & West, 2005). Colleges and universities also invested a large amount of money to support the development of computer-assisted teaching. At present, computer-assisted teaching has become an important part of the daily teaching work of colleges and universities. Computer-assisted teaching breaks the traditional teaching mode so that teachers can make students learn and experience more emotionally and intuitively through sounds, animations, images and other materials, which can stimulate the learning interest of students (Rana & Sharma, 2006). Therefore, the application of computer-assisted geographic information technology teaching is an important way to reform the teaching of geographic information technology.

Based on the above analysis, this paper takes Jiangsu Province as an example and selects the geographic information technology and related professional teachers in colleges and universities to investigate the current status of computer-assisted geographic information technology from the aspects of usage and influence. On the basis of the investigation results, this paper compares and analyzes the teaching effect of traditional teaching method, Powerpoint and GIS assisted geographic information technology and proposes corresponding countermeasures and suggestions for computer-assisted geographic information technology teaching.

Investigation on the status quo of computer-assisted geographic information technology teaching

This paper selects the geographic information technology and related professional teachers in colleges and universities in Jiangsu Province to investigate the current status of computer-assisted geographic information technology from the aspects of usage and influence. A total of 70 questionnaires are distributed and 56 valid questionnaires are returned, with an effective rate of 80%.

Usage of Computer-Assisted Geographic Information Technology Teaching

Selection of teaching methods for geographic information technology Figure 1 shows the investigation results of geographic information technology teachers selecting assisted teaching methods in colleges and universities. It can be seen from the Figure that most teachers use computer network and multimedia to assist the geographic information technology teaching.

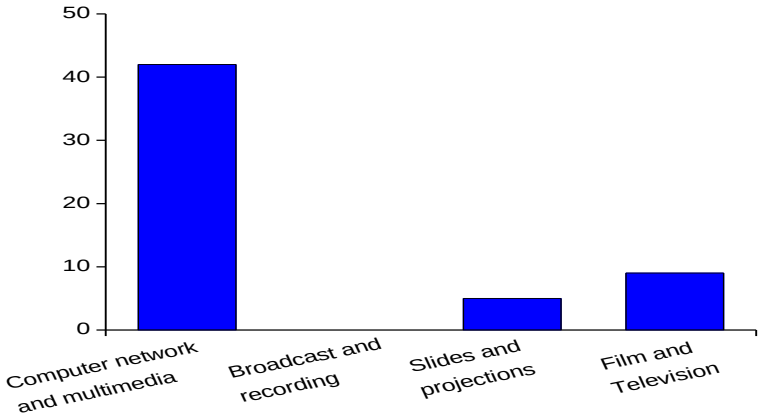

Figure 1. The choice of teaching methods of geographic information technology.

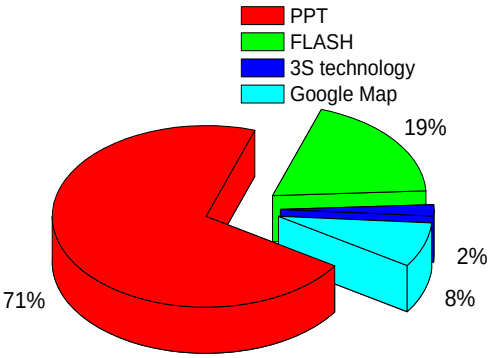

Figure 2. Computer aided means.

Specific method and purpose of computer-assisted geographic information technology teaching Figure 2 shows the investigation results of specific methods that teachers select for the computer-assisted teaching. Although the computer-assisted teaching is generally used by teachers, the method they use is relatively simple. The application rate of PPT is the highest, at 71%, which is due to the high popularizing rate and easy operation of the PPT. The requirement for 3s technology is relatively high, so the usage rate is only 2%.

It can be seen from the purpose of the computer-assisted classroom in Figure 3 that the reason why teachers select computer-assisted teaching is mainly to display the abstract and incomprehensible knowledge to students in the form of pictures and animation through computer-assisted teaching, thus achieving the purpose of stimulating the learning interest of students and breaking through the important and difficult points of teaching.

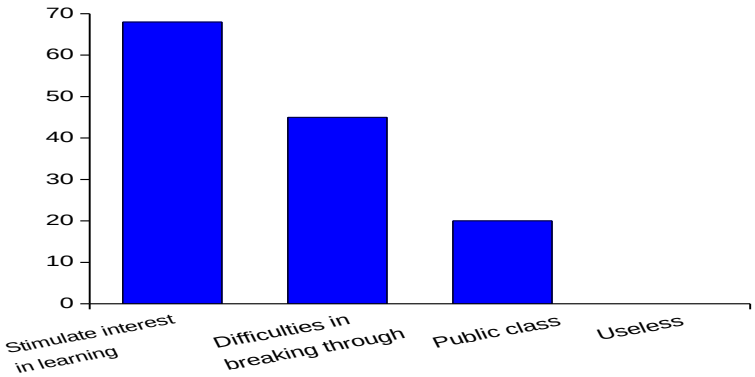

Figure 3. The purpose of computer-assisted classroom teaching.

Impact on Computer-Assisted Geographic Information Technology Teaching

The necessity of making courseware: The investigation results show that more than 90% of teachers believe that it is necessary to make some simple courseware to improve the teaching effect in the teaching process. The investigation of the necessity of making complex courseware (such as 3s modelling and FLASH animation) shows more than 69% of teachers feel it is necessary or relatively necessary, as shown in Figure 4.

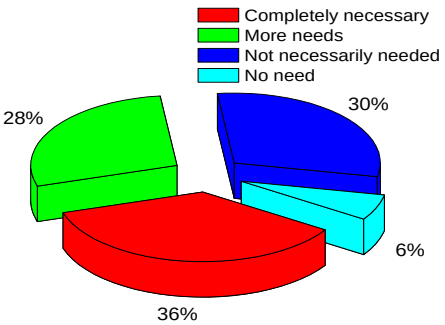

Figure 4. The necessity of making complex courseware.

Impact on teaching and geographic information technology disciplines More than 90% of teachers believe that computer-assisted teaching is very helpful while no teachers think that it is useless. 77% of teachers believe that computer-assisted teaching plays a positive role in promoting the development of geographic information technology.

Through the investigation of college teachers, the majority of teachers have a positive and supportive attitude towards computer-assisted geographic information teaching. Due to the limitations of computer operation level of teachers, teaching methods and hardware facilities of schools, the teaching effect using the computer-assisted geographic information technology is also different.

Practice Research on Computer-Assisted Geographic Information Technology Teaching and Countermeasures and Suggestions

Practice Research on Computer-Assisted Geographic Information Technology Teaching

Powerpoint assisted geographic information technology teaching: Powerpoint is currently the most widely used and most frequently used courseware development software, especially in higher institutions. Powerpoint has lower requirements on the installation environment and it does not require higher information technology level of operators. Powerpoint has the advantages of presentation, pre-setting and interaction with students (Gerwin, 1988).

Generally speaking, the basic steps of Powerpoint teaching are: firstly, teachers introduce courses through questions or pictures and then they use the prepared Powerpoint to explain the content to students, during which teachers can interact with students. The main advantage is that students can intuitively understand the content through pictures and texts. Figure 5 shows the application of GPS in travelling and entertainment when illustrating the GPS application through Powerpoint.

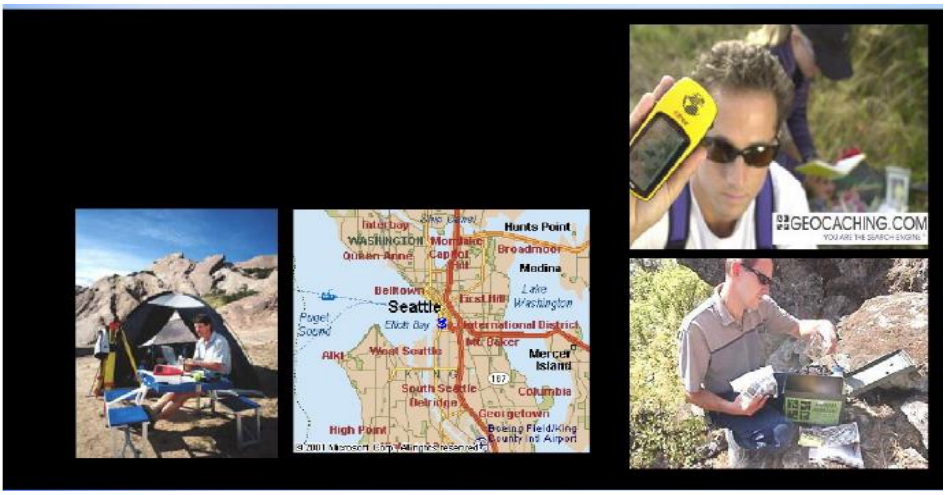

Figure 5. Powerpoint assisted in the application of GPS.

GIS-assisted geographic information technology teaching GIS is the abbreviation of geographic information system, which can collect, store, manage and analyze the geographic information data (Sajaniemi & Kuittinen, 1999). There are many kinds of GIS software and teachers can choose a user-friendly software to assist in teaching according to their own situation.

In traditional teaching of geographic information technology, many pictures required for teaching are printed in the textbooks. Although with the development of network technology, teachers can download the corresponding pictures and display them in PPT, some pictures may not be able to satisfy the needs of teaching and the intention that teachers want to express. Therefore, teachers can draw the required teaching pictures according to their needs, as shown in Figure 6. At the same time, GIS can also be used to query and analyze complex geographic information elements, as shown in Figure 7.

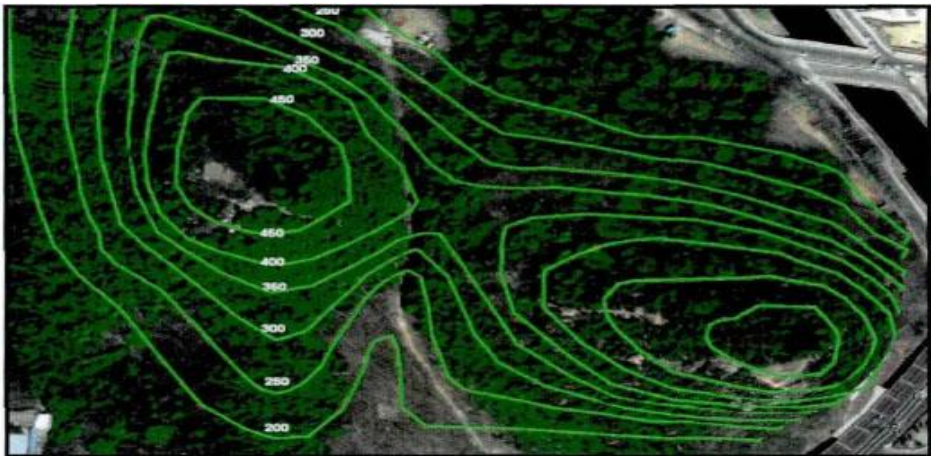

Figure 6. Mountain three-dimensional simulation.

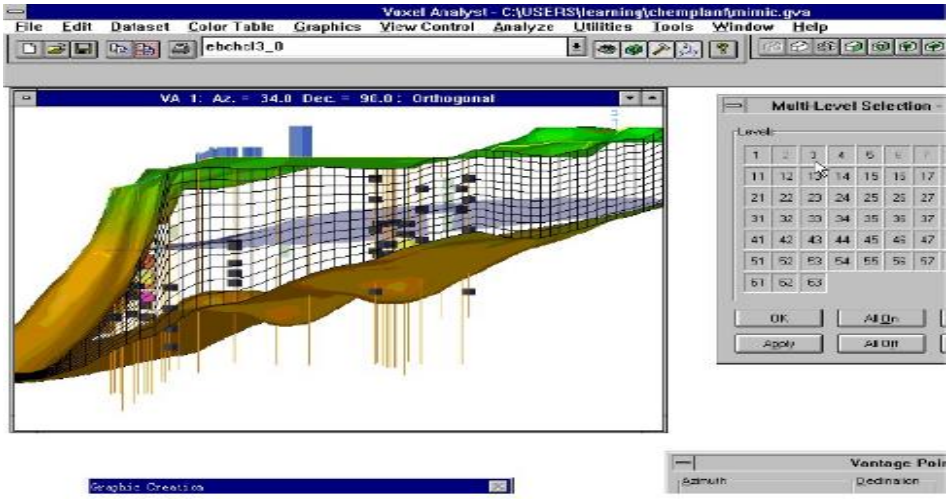

Figure 7. GIS for 3D underground analysis.

Effect comparison of different teaching methods in geographic information technology teaching In this paper, three experimental classes are selected and the traditional teaching method, Powerpoint assisted geographic information technology teaching method and GIS-assisted geographic information technology teaching method are used in these three classes respectively. The teaching effects of three experimental classes are compared and the results are shown in Table 1.

It can be found through comparative analysis that the ranking of the answer rate and correct rate of these three teaching methods are GIS, Powerpoint and traditional teaching method from high to low, indicating that computer-assisted teaching can improve the teaching effect of geographic information technology. However, the Powerpoint is simplify displaying the pictures, texts and questions, although it is an improvement compared with traditional teaching methods, it cannot attract the attention and learning interest of students in that GIS can collect and analyze the data and thus solve the problems in the classroom. Therefore, more computer-assisted geographic information technology teaching methods similar to GIS should be introduced to improve the comprehensive ability and learning effect of students.

Table 1
Comparison of Three Teaching Methods

Teaching methods	Number of completed questions for students at different time periods (Unit: person)			Correct rate	Effect
	Within 3 minutes	Within 5 minutes	Within 8 minutes		
Traditional teaching method	0	6	11	58%	Not satisfied
Powerpoint assisted instruction	4	10	20	70%	Basic satisfaction
GIS assisted instruction	12	22	36	91%	Satisfaction

Countermeasures and Suggestions for Computer-Assisted Geographic Information Technology Teaching

Establishment of efficient geographic information technology teaching classroom using computer-assisted teaching Although the computer-assisted geographic information technology has been widely applied by college teachers, how to build an efficient classroom and make full use of computer-assisted teaching is the focus. This paper believes that teachers must first clarify the importance of computer-assisted teaching. While focusing on technology, teachers should pay attention to the teaching design and teaching methods of the classroom itself. Finally, teachers should utilize all kinds of teaching resources reasonably and use computer-assisted teaching to break through the important and difficult points in teaching and stimulate the learning interest of students, finally achieving the purpose of improving the classroom teaching effect and the comprehensive ability of students.

Basic mode of computer-assisted geographic information technology teaching (1) Classroom teaching mode

The computer-assisted geographic information technology classroom teaching mode is different from the traditional teaching mode. With the support of computer-assisted technology, it can make full use of various

multimedia network and other teaching resources, allowing students to discover, analyze problems and solve problems by themselves. Teachers only act as promoters and guides in this process, which enhances the communication and interaction between teachers and students.

(2) Autonomous learning mode

In computer-assisted geographic information technology teaching, students can use the courseware made by teachers and network resources perform selective learning according to their own interests and time. At the same time, students learn the course content through human-computer interaction, GIS and other related software (Leon, 2009). Students can communicate with classmates and teachers when encountering problems, which is conducive to cultivating the comprehensive ability of students.

(3) Group collaboration mode

Teachers can divide the students into different study groups and the group members should complete the learning tasks in the form of division of labor and group discussion according to the content arranged by the teachers. Different groups can also complete the learning tasks assigned by the teachers through competition. It can enable students to change from passive learning to active learning, stimulate the learning interest of students and improve the comprehensive ability of students and the teaching effect.

Conclusion

With the continuous advancement of science and technology, the informationization in education has attracted more and more attention. This paper conducts the research on the innovation methods of computer-assisted geographic information technology teaching. The specific conclusions are as follows:

(1) Through the investigation of the status quo of computer-assisted geographic information technology teaching in colleges and universities in Jiangsu Province, it is found that most college teachers hold a supportive and affirmative attitude towards computer-assisted geographic information technology teaching. Due to the limitation of individual skill and hardware and software conditions, the teaching effect is different.

(2) The effect of traditional teaching method, Powerpoint and GIS-assisted geographic information technology teaching practice is compared and analyzed and the results show that the teaching effect of computer-assisted geographic information technology is superior to that of traditional teaching method and the effect of GIS is superior to that of Powerpoint.

(3) This paper Proposes countermeasures and suggestions for the computer-assisted geographic information technology teaching from the perspective of establishing the classroom and the basic teaching mode of geographic information technology teaching in colleges and universities.

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