

RESEARCH ON DIGITALIZING EDUCATION OF CHART CARTOGRAPHY OF CHINA

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Abstract

The technologies of computer have been used widely in cartography since the 1970's. The researches and applications of Computer Aid Cartography, Digital Nautical Chart, OGIS and Ocean Database of Mapping and Hydrography have developed rapidly. Some traditional operations and techniques were eliminated gradually. In the late term of 21st century, the production ability of the digital charts of China have reached a certain level. The developments of the theory and practice about chart cartography have brought a big revolution to the research department, production department and teach department in chart. So it is the most important assignment to be studied and solved to bring up more exceptional experts. The technical system changing of chart cartography from handwork to digitalization is stated in this paper. And then, the present situation of digital education of cartography is analyzed. After that, the developing tendency of digital education of cartography in the 21st century is discussed, such as making out new digital subject system, digitalizing teaching means and methods, increasing training levels, building up digital providing system of teaching, giving some training model for the students both mapping and surveying, paying more attention for language and computer training. At last, the necessary of Digitalizing Education of Chart Cartography was illuminated from the sight of the Digital Earth, Digital Map and Digital Chart.

Keywords

Digital chart Technical system Digital education Training model

1. Introduction

Since 20th century, charting's theory and technique have tended to become scientific and complete with the developments of the science and technology and the perfection of the chart teaching, chart compilation, publishing theory and technique. Specially since 1970s, because the computer technique has been used widely and CAC, Digital Chart, OGIS, Hydrographic survey and charting data base have been researched and applied quickly, some old operations and chart techniques were eliminated. And the digital chart's producing

techniques are turning to maturity. There are some certain production abilities in digital chart making in late 20th century. Further more, a profound revolution has come in chart making and teaching departments with the great developments of charting theory and practice. Facing with the 21st century, how can we let the education adapt to the changes in order to bring up more good students for the charting departments? It needs to be solved urgently.

2. The digitalizing technical system and the present situation of the digitalizing education in charting of China

2.1 The present situation of the digitalizing technical system in China

In the second half of 20th century, there were two leaps in charting. The first was the found of the charting technical system with the efforts of the charting workers from 1950s to 1980s. It calls the traditional charting technical system which was marked with some hand-operation-tools, such as plotter , type machine , camera and drawing and scribing instruments. The second was the change from traditional system to modern system, in other words, from the manual charting system to the digital charting system whose main techniques are “3s” after late 1980s. The classifications have increased. Besides the paper chart, there are many digital charts preserved in disk, magnetic tape, CD and so on. The publishing was also from the separated steps---compilation, drafting, copying, plate making and so on, to digital pre-publishing system automatically do all the works by computer. With the appearances of the GPS technical, satellite hypsometry, ORS, OGIS, VR and mode recognition and the update of charting software and hardware, charting is closely related with “digit”. Especially, with digital charts to be unified and intellectualized, the digitalizing charting system turns to mature.

2.2 The present situation of education in charting digitalization in China

In recent 10 years, it becomes an urgent assignment for the universities to train the workers in the charting departments because the great developments of the new technique and the digital equipments made their drawbacks obvious. The universities are short of the fund to buy new equipments to update their teaching facilities but the charting departments can do, so the universities are behind the charting departments in equipments. It leads to the phenomenon that the teachers feel difficult to improve their knowledge and their knowledge structure became old. So the shortage of the teaching equipment and the old knowledge structure of the teacher group are the two problems the universities should face with to carry out the digital education. It is difficult for them not only to carry out digitalizing education but also to train persons for the charting departments on a regular time schedule. The contradiction the universities educational abilities are behind the needs of the talent persons will directly affect the developing speed and scope. For this reason, a large-scale and deep-level revolution about digitalizing education should be carry out in universities.

3. Developing direction of the education in charting digitalization

Following what has been talked above, we should pay more attention to the digitalizing education in order to bring up more talent persons for cartographic departments.

3.1 Make up new curriculum system of charting digitalization

It should embody the scientific features, advancement and systematization to set up the curriculum. Besides the public basic curriculum demanded by the national teaching departments for the corresponding educational record, it is necessary that strengthen the specialized course, carefully chose the teaching contents and increase the courses including more skills. In addition, distribute the percentage of the public basic course, the special basic course, the specialized course , the selective course and the practice. The selected courses should be more and to trace the road called “three more and one less”---more course types, more new technique and skill, more courses related with the digitalizing teaching , but the class hours of each course are less. It is to let the students know much information about the surveying and mapping as possible.

After the teaching program has been set up, we should do our best to optimize the contents of each course. In the optimization process, firstly, the basic courses should be emphasized, and we should reduce the teaching percentage of traditional charting and increase the class hours of the digitalizing techniques. If necessary, delete some eliminated courses and combine some related courses. Secondly, the basic theory of surveying and mapping, the new and advance theory should be emphasized so that the students can have a good theory foundation to be reeducated after finishing school.

3.2 Make use of the digitalizing teaching methods and measures

The digitalizing teaching contents need the digitalizing teaching methods and measures. The methods should be various, for example, elicitation method, discussion method, analysis method and practice method. In class, the teacher should reinforce the students' cognition about the theory and let them get the ability to solve problems by showing some illustrations. Nowadays, some universities practice a teaching mode called “ teach one , exercise two , test three “---teach only important contents, do more exercises, test contents more than that of the teaching and exercise . It will do good to the students' ability training. The teacher should optimize the teaching contents, use different teaching methods flexibly, let students be free from the memorizing mechanically, train the students' interesting towards study and so on. Object, wall chart, slide projector and record have played a good role in charting teaching in the 20th century. Now, we can use the computer multimedia techniques to give the multimedia teaching course. We should make good use of them to reach the best effects in teaching. On the side, every university can share other ones' educational resources through the computer web, such as the electric materials for teaching. In future, some special surveying and mapping teaching website should be founded in order to give the same lessons at the different places and tackle key problems jointly. The more quickly the idea become true, the bigger the digitalizing teaching's effects are.

3.3 Raise the education levels

It needs the talent persons with high level to use the digital charting technical system. So the keys of the problem are the undergraduate education and graduate education. The combination with other scientific research departments and universities in graduate education is necessary because digitalizing teaching is an open teaching. These departments can become the stations of graduate students, in which there are lots of skilled personnel with good scientific research abilities and many scientific research items. In addition, it's important to learn other universities' good experiences and set up the exchange system of both students and teachers if the conditions allowed. This can take some steps to broaden the specialty and improve the teaching quantity so that more talent persons can engaged in the digitalizing technical system.

3.4 Found up the complete digitalizing teaching indemnification system

To set up the digitalizing teaching indemnification system is the more important thing in order to improve the situation that the universities' equipments are behind the production departments. There are three ways. Firstly, use the scientific research to drive the teaching. It means to bring the advanced equipment in teaching into full play if the scientific research allowed. Secondly, strengthen the construct of teaching simulators. Using them correctly can get bigger efficiency with less teaching resources. Thirdly, carry out the open teaching with the aids of the production departments. In other words, students learn theory in school and do practice in the production departments. It can make the teaching close to the production realities and properly accomplish the combination of teaching and practice. This shortens the time of adopting talent persons and creates a nice environment for them.

3.5 Carry out the common education mode combining the mapping and surveying

With the improvements of the digitalizing level, the boundary between the surveying and mapping is not obvious . The two subjects have interpenetrated each other for the surveying departments can directly give the digital surveying results and the production departments can use them to compile digital charts and paper charts. So these talent persons who thoroughly know this two subjects are needed by the ocean surveying and mapping departments. For this reason, we should weaken the specialty division in universities' education and let the two subjects interpenetrate well. The combining education mode is a proper mode, which means the students study the basic courses within 3 years without the specialty division and are divided to different specialties in the last year according to the persons' requirement situation. It can improve the students' abilities to accommodate the work in practice and enhance their specialty capacity.

3.6 Enhance the computer and language teaching

Computer and language are the basic tools for the persons to study and use the digitalizing surveying and mapping equipment. It should be strengthened especially the foreign language. Besides the Windows Operation System, Ocean Surveying and Mapping Data Base, Arc/Info, InterGraph should be studied either in computer teaching. Higher grade

couldn't stop foreign language study. Firstly, specialty language and lots of relative vocabulary should be taught for students to improve reading speed and study the newest subject developments. Secondly, computer language should be offered for them to master computer techniques and know well about the ocean digitalizing equipments.

4. Conclusions

Human being has stepped into the information period delegated by digitalization. And "Digital Earth" has been a more popular conception which attracts more and more peoples' attention. A deep information technique reform will happen all over the world with the establishment of the "Digital Earth". Digital map is an important part of "Digital Earth" and digital chart is a kind of digital map. So the maturity of the chart technique system will do good to the establishment of Digital Earth. If a completely chart digitalizing education system is not found, the maturity of the chart technique system will become the water without sources. " So the more important thing is education and it is imperative to carry out the charting digitalizing education.

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