

Exploration of GIS Theoretical Teaching Framework under the Background of "Internet +"

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Abstract: Geographical Information Science (GIS) is a major with a wide range of social needs and rapid development, it is crucial whether its teaching framework is properly arranged or not. Under the background of "Internet +", it is necessary to reform the courses framework of geographic information science in the universities. We carried out a series of explorations and reforms in terms of GIS teaching goals, teaching model and curriculum assessment methods through combining the background of "Internet +" with the actual situation of GIS professional development. Our goals are to build a better teaching framework for geographic information science that meets national standards and the society under the era of information and internet. The framework can provide basic principles courses and innovative practical courses; it will help us bring up the elites on geographic information science, which own basic geographic literacy, spatial cogitation, computational ability, certain aesthetic ability and healthy personality.

Keywords: "Internet +"; GIS; Mobile Curriculum

1. Introduction

With the rapid development of the geographic information system (GIS) industry, colleges and universities need to cultivate GIS professional innovation and professional elite talents to meet the needs of society. However, under the background of the information society and the "Internet +" era, the traditional college talent training model has greatly restricted the vitality of this innovative and entrepreneurial talent cultivation and incubation. "Internet +" is a further practice of Internet cogitation and a new innovative network platform combining traditional industries with the Internet. It represents a new social form which has profoundly affected our daily life. In this way, geographic information system professionals who are closely related to computer and network technology have a broader space for development and employment. Therefore, during the process of training GIS professionals in colleges and universities, we should infiltrate the "Internet +" cogitation into teaching and assessment system, which can improve the students' ability to combine theory and practice, and increase graduates ability to employment; furthermore, it can expand the employment field of graduates.

Under the background of "Internet +", Chinese education scholars have carried out many teaching attempts and researches in related fields, but their works are generally concentrated on the construction of computer majors in universities, it is rarely carried out in other majors. The GIS major is a specialized field based on the computer, and it has more advantages in the integration with the Internet. In the past ten years, the construction and teaching of GIS major in China has also been paid attention by many GIS teachers and researchers^[1]. They built an online teaching resource library^[2], optimized the teaching staff^[3], formed a curriculum

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group^[4-5], improved the course textbook construction^[6], reformed the assessment mechanism, etc. These studies are all to improve and explore GIS construction. This article takes the GIS theoretical teaching framework as the entrance, we discuss its reform ideas and implementation plans to provide guidance and help for other related professional development.

2. Change of theoretical teaching framework

2.1 Changes in teaching model

Taking Outcome-based education (OBE) as our educational theory, we updated course content, improved teaching methods, and innovative assessment methods to build a mobile classroom model which mixed online and offline education in theory courses of GIS. Its implementation steps include: A) project division and course setting; B) student selection and grouping; C) online video classroom; D) teacher-student feedback discussion; E) student mid-term report; F) course summary And discussion (see Figure1).

	Teacher Responsibilities	Student Task
Stage A: Setting and Assignment	<ul style="list-style-type: none"> —Theme determination —Teacher Assignment —Courses Leaflet 	<ul style="list-style-type: none"> —Understand course —Select and registration —Confirm schedule
Stage B: Selection and Grouping	<ul style="list-style-type: none"> —Theme Content Design —Syllabus Design —Schedule Confirmation 	<ul style="list-style-type: none"> —Build group —Select theme —Submit proposal
Stage C: Online Video Class	<ul style="list-style-type: none"> —Design video class —Record video class —Submit to the system 	<ul style="list-style-type: none"> —Seminar —Literature research —Discussion
Stage D: Mid-term Assessment	<ul style="list-style-type: none"> —Professional platform —Professor choosing —Feedback mechanic 	<ul style="list-style-type: none"> —Results analysis —Mid-term report —Theme presentation
Stage E: Feedback and Seminar	<ul style="list-style-type: none"> —Mid-term assessment —Group assessment —Arrangement camps 	<ul style="list-style-type: none"> —Summary report —Theme dissertation —Display and feedback
Stage F: Summary and Discussion	<ul style="list-style-type: none"> —Seminar —Summary —Assessment 	<ul style="list-style-type: none"> —Seminar —Summary —Assessment

Figure 1. Scheme of GIS Mobile Teaching Based on "Internet +".

2.2 Updating on courses content

Courses content should be updated in real time according to the rapid development of geographic information science and technology. We should combine the scientific research results of GIS at home and abroad to further understand the theoretical knowledge in order to deepen the students' grasp of what they have learned, improve their practical ability and comprehensive application ability; we should also focus on frontier issues and master the development status and trends of professional curriculum. In this way, students' innovative thinking ability and forward-looking ability are developed. At the same time, we should also properly introduce ideological and political content and aesthetic content to help college students establish a correct view on life and world, and comprehensively improve their comprehensive quality.

For example, we introduced the content of the Middle East Railway in the course of "Principles of Geographic Information Systems". In the classroom, students learned the historical background of the Middle East Railway, remembering the history and the honor and disgrace of the Chinese nation. Through surveys and remote sensing images, students extract natural and human landscapes along the Middle East Rail Line, which can help students master the process of spatial data collection and processing; the visual field range along the Middle East Railway Line can be obtained through the analysis of the digital elevation model, etc. In this teaching process, we have incorporated the content of modern Chinese history and culture, so that students have established national self-confidence and honor, it has cultivated students' historical patriotic feelings, and also provided correct historical values, holistic and time-space views for environmental protection and ecological construction education.

1.3 Improvement in teaching ways

In the process of teaching activities, we must take students as the center and promote the diversification, networking, convenience and flexibility of teaching methods. We organized a series of teaching competitions and improved the teaching methods through the feedback of students. At the present, there are many types in teaching ways: neat blackboard writing, colorful slides, intuitive 3D animations, stereoscopic videos, information-rich network sharing platforms, convenient and effective mobile

classrooms, etc. Our goal is to gradually eliminate 'water courses' and establish 'gold courses', so as to carry out offline and online mixed teaching.

For example, in the "Geographic Information System Principles" mobile classroom, we use an APP called "Learning Link" on the cell phone to allow students to participate in the classroom to the maximum extent. It includes various forms of classroom check-in methods, the simultaneous distribution of online teaching videos and materials, the release and discussion of course topics, the online assessment and scoring of assignments and exams, etc. These allow students to conveniently implement pre-class preview and review effectively after class. It fundamentally changes the traditional teaching model of students' passive input of knowledge, and at the same time fully utilizes the value of students' mobile phones in the classroom.

2.4 Changes in assessment methods

The traditional college curriculum evaluation system is too singular and standardized, and cannot reflect the characteristics of different majors, nor can it truly and fairly reflect the differences between students' theoretical and practical skills. With the help of the Internet, we have established an online assessment system for undergraduates. It is an all-round integration of the undergraduates' staged assessment, final assessment and course thesis. We try to build an open and diversified assessment system. At the same time, through the establishment of the system, we can change the centralized standardized examination mode of characteristic majors, abandon the traditional assessment method, and achieve the purpose of network and openness. At the same time, we can also integrate various open test questions through the network environment, and use the mobile APP to achieve exams through classroom design, summary reports, assignment papers, etc., which is flexible and convenient.

3. Conclusion

This article mainly discusses an attempt and exploration of a theoretical teaching system of GIS specialty under the background of the Internet +combined with the actual situation of professional construction. Judging from the employment of graduates in the past three years, the reform has achieved remarkable results and the quality of GIS graduates has improved significantly. The total employment rate reached more than 80% .

Generally, we should not only focus on the accumulation of GIS disciplines, but also combine the advantages of geosciences in the fields of ecology, environment and resources. More importantly, only through continuous improvement and exploration on the basis of the National Ministry of Education's science professional certification standards and national standards can we achieve greater breakthroughs in training GIS professionals.

References

1. Zhang H. Some issues and countermeasures in the current GIS teaching practice. Proceedings of "Decision-making Forum-Seminar on Regional Development and Public Policy Research"; 2016.
2. Liu M, Zheng C, He G. "Introduction to GIS" network teaching resource database construction. *Surveying and Mapping Engineering* 2012; 21(2): 77-80.
3. Zheng C, Hu H, Zhong G, et al. On the construction of geographic information system teaching team in local colleges. *Teaching and Educating People* 2013; (10): 42-43.
4. Zhou A, Fu X, He D, et al. Exploration of geographic information science curriculum group construction. *Surveying and Spatial Geographic Information* 2017; 40(7): 48-49+53.
5. Long C. Curriculum group construction: Path selection of curriculum teaching reform in universities. *Modern Education Science* 2010; (2): 139-141.
6. Shen J, Tang G, Yang H, et al. The construction and application of the professional textbook of geographic information system in China. *Earth Information Science* 2007; 9(4): 94-99.