

Design and Practice of Civics Teaching in GIS Spatial Analysis Course under the Concept of OBE

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Abstract: This study aims to combine the OBE concept with the ideology and politics of GIS spatial analysis course to cultivate high-quality talents with socialist core values. Firstly, the integration point of OBE concept and course ideology and politics was analyzed, and then the teaching system of GIS spatial analysis course based on OBE concept was designed, including teaching objectives, teaching contents, teaching methods and teaching evaluation system. The teaching system focuses on students' participation and interaction, paid attention to students' needs and learning characteristics, and at the same time integrates elements of ideological and political education to cultivate students' socialist core values and vocational literacy. Finally, the learning process of students was tracked and analyzed by testing and evaluating students' learning outcomes, while the teaching design was continuously improved and optimized by combining students' feedback and improvement opinions. This study was of great significance for promoting the development of geographic information industry and the construction of GIS spatial analysis courses.

Keywords: Outcome-Based Education Concept; GIS Spatial Analysis; Curriculum Civics; Socialist Core Values; Teaching Evaluation System

1. Introduction

With the acceleration of globalization, the education field is also exploring and trying new education concepts and models. Outcome-Based Education (OBE), as an advanced education concept, emphasizes student-centered, outcome-oriented, and reverse design of the education process^[1]. Geographic Information System (GIS) spatial analysis, as a core course in geographic information science, and the design and practice of its Civic and Political teaching were the recent years hotspots of attention in the field of education.

With the introduction of the OBE concept, more and more scholars have begun to pay attention to its application in the design of Civics teaching in GIS courses^[2]. Some scholars have explored the combination of the OBE concept and the design of Civics teaching in GIS spatial analysis courses from the theoretical level, and put forward a series of Civics teaching design methods based on the OBE concept^[3]. Integrating Civic and Political Elements into Case Teaching of GIS Spatial Analysis so that Students Feel and Understand the Civic and Political Spirit in Practice^[4].

With the rapid development of information technology, geographic information system (GIS) has been widely used in various fields and become an indispensable technical means in modern society^[5-7]. GIS spatial analysis, as the core part of GIS, was of self-evident importance. However, traditional GIS spatial analysis courses often focus only on the teaching of technology and neglected the cultivation of students' values and professionalism^[8]. In order to solve this problem, this study combines the OBE concept with the ideology and politics of GIS spatial analysis course, aiming to cultivate high-quality talents with socialist core values, which was of great significance to promote the development of China's geographic information industry and the construction of GIS spatial analysis course.

2. Analysis of points of convergence between the OBE concept and curriculum-based political thinking

The concept of OBE (Outcome-Based Education) emphasizes paying attention to students' learning outcomes and learning process in the education process, so as to adjust teaching strategies in a targeted manner and improve the quality of education. Curriculum Civics, on the other hand, was to integrate elements of ideological and political education into the curriculum to realize the organic unity of knowledge transfer and value leadership.

2.1 Teaching objectives

The GIS Spatial Analysis course was a required course for Geographic Information Science majors with 48 hours and 3 credits. It was taken for junior students majoring in Geographic Information Science. According to the concept of OBE, it was emphasized that the teaching objectives should be clear, specific and operable. In the context of course ideology, the teaching objectives should not only focus on students' technical skills, but also on cultivating students' socialist core values and professionalism. Therefore, the Civic-Political elements can be integrated according to the key points of the syllabus, and the theory and practical operation can be fully combined to constitute the knowledge modules of the course, and the potential Civic-Political elements can be deeply excavated for each just module. The integration of Civic-Political elements with professional knowledge can stimulate students' interest in learning, strengthen knowledge learning and achieve the expected teaching effect.

2.2 Teaching content

The OBE concept requires that the teaching content should be centered on the teaching objectives, and at the same time pay attention to the needs and learning characteristics of students. In the context of curriculum ideology and politics, the teaching content should incorporate elements of ideological and political education, focusing on guiding students to establish a correct worldview, outlook on life and values (Table 1).

Table 1 Integration points of Civic Education in teaching content

point of knowledge	Civics Element	Content of Civics
Spatial data acquisition methods	sense of social responsibility	To guide students to pay attention to the development and international competitiveness of the geographic information industry and to develop a sense of social responsibility.
Spatial data modeling methodology	Socialist core values	Emphasis is placed on integrating socialist core values into the curriculum and fostering a correct worldview, outlook on life and values among students.
Spatial data visualization methods	professionalism	Focus on developing students' professionalism, including teamwork, communication skills, and creative thinking.

2.3 Teaching methods

The OBE concept emphasizes the diversity and flexibility of teaching methods and focuses on student participation and interaction. In the context of curriculum ideology, teaching methods should focus on guiding students to think about problems, problem-solving methods, and cultivating students' innovative and critical thinking (Table 2).

Table 2 Integration points of Civic Education in teaching methods

Teaching methods	point of knowledge	Content of Civics
classroom teaching	Basic concepts and principles such as spatial data modeling theory, spatial relationship theory, and spatial cognition theory.	Evaluation criteria that incorporate socialist core values, focusing on the evaluation of students' ideological and moral qualities and professionalism.
case Study	Applications in solving practical problems, such as urban planning, environmental protection, resource management, etc.	Incorporating the element of social responsibility in the ideology, students are guided to pay attention to social issues, cultivate a sense of social responsibility, and pay attention to the development of geo-information industry and international competitiveness.
panel discussion	Acquisition, processing and management of spatial data	Incorporate the Civics elements of teamwork and communication skills to develop students' teamwork and communication skills.
hands-on	Methods and techniques of GIS spatial analysis, such as spatial queries, map overlays, buffer analysis, etc.	Incorporate elements of creative thinking and critical thinking in Civics to develop innovative and critical thinking in students.

2.4 Evaluation of teaching and learning

The OBE concept emphasizes that teaching evaluation should be objective, fair and comprehensive, while focused on students' feedback and improvement. In the context of curriculum ideology, taught evaluation should incorporate the evaluation criteria of socialist core values and focus on the evaluation of students' ideological and moral quality and professionalism (Table 3).

Table 3 Integration points of Civic and Political Education in Teaching Evaluation

point of knowledge	Teaching evaluation methods	Content of Civics
Concepts and applications of spatial data visualization	Through hands-on projects, students are evaluated on their ability to visualize spatial data using GIS and to interpret geographic information from visualization results.	Introducing our advanced technology in map-making and geographic information acquisition, fostering students' national pride and promoting a sense of family and country.
Application of spatial analysis in solving practical problems	Through case studies, students are evaluated on their ability to use GIS spatial analysis to solve real-world problems, as well as their teamwork and communication skills.	Emphasize the importance of spatial analysis in nation-building and social development, and develop students' sense of social responsibility.

Access to and sharing of global geographic information resources	Evaluate students' ability to access, organize, and share global geographic information resources, as well as their awareness of copyrights and laws.	Emphasize the importance of international cooperation and exchange, and cultivate students' global vision and cross-cultural communication skills. At the same time, students are guided to respect intellectual property rights and establish correct values.
Application of Geographic Information Systems in environmental monitoring and protection	The hands-on project evaluates the students' ability to use GIS for environmental monitoring and protection program design, as well as their awareness of environmental protection.	Emphasize the concept of harmonious coexistence of man and nature, and cultivate students' awareness of environmental protection and sense of social responsibility.
Development trends and cutting-edge applications of GIS technology	Evaluate students' knowledge of trends in GIS technology and their spirit of exploration of new technologies and methods.	Students are guided to pay attention to the major strategic needs of the country, and to cultivate their innovative spirit and technological self-confidence. At the same time, it emphasizes scientific and technological ethics and responsibility and guides students to establish correct scientific and technological values.

3. Instructional design and practice of the GIS spatial analysis course on Civics and Politics

3.1 Design of teaching objectives

Based on the OBE concept, and taking into account the requirements of the society, clear, specific and actionable teaching objectives were formulated. Specifically, it includes three aspects of knowledge objectives, skill objectives and quality objectives. Among them, the knowledge objective mainly involves the basic principles and methods of GIS spatial analysis; the skill objective requires students to be able to use GIS software to analyze spatial data; and the quality objective focuses on cultivating students' socialist core values and professionalism (Table 4).

Table 4 Instructional design of GIS spatial analysis course based on OBE concepts

knowledge goal	skill target	quality objective
1. To master the basic concepts, principles and methods of GIS spatial analysis, and to understand its important position in geographic information science.	1. Ability to use GIS software for data input, processing, analysis and output, and to independently complete the establishment and maintenance of spatial databases.	1. To foster creative thinking and teamwork among students and to encourage them to explore and innovate in the field of GIS spatial analysis.

<p>2. Familiar with various GIS spatial analysis tools and techniques, including but not limited to spatial query, map visualization and spatial statistical analysis.</p>	<p>2. Master the basic processes and methods of GIS spatial analysis, and be able to select appropriate analysis tools and techniques according to actual needs.</p>	<p>2. Enhance students' awareness of independent and lifelong learning and their ability to develop themselves and adapt to social changes.</p>
<p>3. To understand the application cases of GIS spatial analysis in different fields, such as urban planning, environmental protection and resource management.</p>	<p>3. Ability to design and produce maps, and to produce high-quality maps and charts using GIS software for data visualization and information transfer.</p>	<p>3. Cultivate students' professional ethics and sense of social responsibility, so that they can pay attention to the sustainable development of society and the public interest in the practice of GIS spatial analysis.</p>
	<p>4. To develop the practical skills of students to enable them to solve practical problems and accomplish specific tasks, including, but not limited to, spatial data acquisition, processing, analysis and application.</p>	

3.2 Teaching content design

According to the taught objectives, combined with the requirements of the course Civics, the teaching content was designed with reference to the integration point of Civics education. Specifically, it included both theoretical teaching and practical teaching.

Among them, in terms of theoretical teaching, it can start from the basic principles of spatial analysis, and when introduced the basic concepts of geography, spatial relations and spatial analysis methods, it can be combined with China's geographic situation, emphasize the uniqueness and complexity of China's geographic environment, and cultivate students' patriotic feelings and spirit of exploration; and it can also start from the case study, selected actual cases with social significance, such as urban planning, environmental protection, resource management, etc., guiding students to analyze the moral, ethical and social responsibility issues therein and cultivating their sense of social responsibility.

In terms of practical teaching, the first was the selection of experimental projects, which can be chosen to be closely related to actual production and life, such as urban population distribution research, land use change analysis, etc., so that students can experience the application value of GIS technology in practice and enhance the consciousness of serving the society. Next was GIS software operation. In GIS software operation, teamwork, data safety and standardization awareness were emphasized to cultivate students' professionalism and rigorous working attitude. Finally, it was the writing of the experiment report, which requires students to write the experiment report, focusing on the logic and clarity, while emphasizing the scientific attitude of seeking truth from facts and rigorous academic ethics.

3.3 Design of teaching methods

According to the OBE concept and the requirements of the course Civics, flexible and diverse teaching methods were designed. Specif-

ically, they include classroom lectures, case studies, group discussions, role plays and other forms. Among them, classroom lectures mainly adopt the way of teachers' explanation and students' listening; case analysis guides students to think about problems and problem-solving methods by analyzing actual cases; group discussion and role-playing cultivate students' teamwork ability and communication ability through interaction and cooperation among students. At the same time, the teaching process focuses on guiding students to think about the problem and the cultivation of the way of thinking.

3.4 Design of teaching evaluation system

According to the OBE concept and the requirements of curriculum Civics, an objective, fair and comprehensive teaching evaluation system was designed. Specifically, it included three aspects: students' self-assessment, peer assessment and teachers' evaluation. Among them, students' self-assessment mainly involves students' evaluation of their own performance in the learning process; peer evaluation promotes communication and learning through mutual evaluation among students; and teachers' evaluation consisted of teachers' evaluation and feedback on students' performance. At the same time, the evaluation standard of socialist core values was integrated into the teaching evaluation system, focusing on the evaluation of students' ideological and moral quality and professionalism (Table 5).

Table 5 Design of teaching evaluation system for GIS spatial analysis courses based on OBE concepts

dimension	Evaluation methodology	concrete content
student self-assessment	self-awareness	Students need to reflect on their attitudes, learning methods and learning outcomes to identify their strengths and weaknesses in the GIS Spatial Analysis course.
	target setting	Students should set personal learning goals that define the level they wish to achieve in the GIS Spatial Analysis course and provide direction for subsequent learning.
	self-esteem	During the learning process, students should evaluate their own performance, including class participation, completion of homework, and ability to perform experiments, in order to make timely adjustments to their learning strategies.
peer review	Group work	Students are divided into groups for cooperative group learning. Group members share their learning experiences and methods with each other to promote common progress.
	mutual evaluation	Objective and fair evaluation among classmates based on the performance of group members in the GIS spatial analysis course. The evaluation includes communication and expression skills, problem solving skills, etc.
	mutual inspiration	Through mutual assessment, students are motivated to learn and learn from each other, forming a good learning atmosphere.
teacher assessment	classroom performance	Teachers observe students' performance in the classroom, including answering questions, participating in discussions, and performing experiments, and evaluate students in real time.
	Assignments and Lab Reports	The instructor evaluates students' assignments and lab reports to see how well they have mastered the theory and practice of GIS spatial analysis.
	final	Students' comprehensive skills in GIS spatial analysis are assessed through a final exam that tests their learning outcomes.
	Feedback and Guidance	Teachers give students timely feedback and guide them to adjust their learning methods to improve their learning results.

3.5 Analysis of Teaching Practice and Effectiveness

Apply the above instructional design to actual teaching and analyzed its effects. Specifically, it included testing and evaluating students' learning outcomes, tracking and analyzing students' learning process. At the same time, the teaching design will be continuously improved and optimized with the feedback and improvement opinions of students.

4. Concluding remarks

Based on the OBE concept and the requirements of course Civics, this study had conducted an in-depth discussion on the teaching design and practice of Civics in GIS spatial analysis course. By analyzing the integration point of OBE concept and curriculum Civics, the teaching objectives, teaching contents, teaching methods and teaching evaluation system are designed and put into practice in teaching practice. The teaching design aimed to be able to effectively improve students' learning outcomes and cultivate students' socialist core values and professionalism. This study not only provided a useful reference for the teaching design of Civics in GIS spatial analysis course, but also provided a reference for the teaching design of Civics in other courses. In the future, we will further improve and optimize this teaching design to better serve the development of China's geographic information industry and the construction of GIS spatial analysis course.

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