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Teaching Reform in Urban Planning System Engineering: Integrating the Concepts of the Slow System and Barrier-Free Design

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Abstract: ***With the acceleration of urbanization and the increasing complexity of urban problems, the importance of urban planning system engineering in higher education has become increasingly prominent. However, the current teaching system still faces multiple challenges, such as limitations in teaching content, traditional teaching methods, and an imperfect evaluation feedback mechanism. This study focuses on cultivating high-quality urban planning professionals with innovative thinking and practical abilities. By introducing the concepts of slow-moving system and barrier-free design into the urban planning system engineering curriculum, a series of teaching reform measures have been implemented, including optimizing course content, upgrading teaching methods, and improving the assessment mechanism, to provide new ideas for the modernization of urban and rural planning education.***

Keywords: Urban planning, Systems engineering, Teaching reform.

1. Introduction

Urban planning system engineering is a highly integrated discipline, which integrates the methodology of system engineering and urban planning practice. It is committed to promoting the efficient and sustainable development of urban space by using comprehensive and systematic analysis and planning methods. The core of this discipline is to apply system engineering theory and technology to urban planning practice to deal with and solve various complex problems in the process of urban development.

In recent years, with the concept of improving urban environmental quality and enhancing social inclusion deeply rooted in the hearts of the people, slow-moving systems and barrier-free design have become an indispensable part of urban planning and construction. The slow-moving system refers to a safe, convenient and comfortable travel road network and facility environment for pedestrians, bicycles and other non-motorized traffic, leading to a healthy and environmentally friendly travel fashion. At the same time, barrier-free design focuses on eliminating physical barriers in urban spaces for people with disabilities, the elderly, and other people with reduced mobility, ensuring that everyone can use public spaces equally and conveniently. The deep integration of these two concepts not only greatly improves the quality of urban living and promotes sustainable development, but also highlights social equity and humanistic care, making the city a more livable and harmonious social space.

It is of great significance to integrate the concepts of slow traffic systems and barrier-free design into urban planning education. This paper discussed teaching reform from three key aspects: teaching content, teaching method and evaluation feedback (Figure 1). The slow-moving system and barrier-free design concept were deeply embedded in the curriculum system of urban planning system engineering, including multiple perspectives such as theoretical learning, case analysis and practical operation. The knowledge of architectural design, sociology, environmental science and other disciplines was closely intertwined with urban planning to cultivate students' ability to comprehensively analyze and solve practical problems.

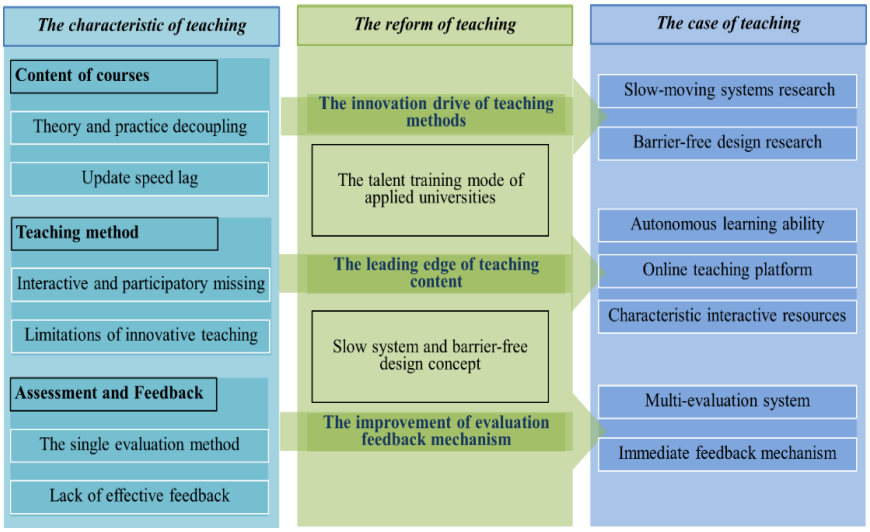

Figure 1: Teaching reform of urban planning system engineering

2. Current Situation and Characteristics of Urban Planning System Engineering Teaching

In the teaching practice, we found and systematically summarized several key issues, mainly related to the frontier of teaching content, the innovation of teaching methods and the effectiveness of evaluation and feedback mechanisms.

2.1 Limitations of Teaching Content

One is the decoupling of theory and practice. At present, the construction of the teaching system of urban planning system engineering often focuses on the theoretical knowledge framework, but fails to build a bridge between theoretical knowledge and practical application. This imbalance leads to the fact that although students have mastered a wealth of theoretical knowledge, it is difficult to translate what they have learned into the ability to solve practical problems in practical work. Second, update speed lag. With the rapid development of theory and practice in the field of urban planning, new ideas, new technologies and new methods are emerging in an endless stream and rapid iteration. However, the pace of updating the teaching content has not kept up with the pace of industry development, resulting in the knowledge and information that students come into contact with in the classroom, which is outdated compared with the industry frontier. This lag not only limits students' acquisition of the latest knowledge, but also weakens their competitiveness in the future workplace.

2.2 Traditionality of Teaching Methods

One is the lack of interaction and participation. The traditional teaching method is more inclined to one-way indoctrination, teachers lead lectures, and students are in a state of passive acceptance. This model greatly limits students' ability to actively explore the unknown and dare to question. It not only fails to effectively stimulate students' enthusiasm in learning, but also inhibits the cultivation and development of their innovative thinking. Second, the limitations of innovative teaching methods. Although in the wave of education reform, many people of insight try to introduce innovative teaching methods such as project-driven learning and case studies to enhance students' practical ability and problem-solving ability. However, on the whole, these innovative teaching methods have not yet been popularized and widely used in the teaching practice of urban planning system engineering. This not only reflects the shortcomings of educators in conceptual change and skill training, but also highlights the challenges of the education system and resource allocation.

2.3 Imperfection of Evaluation and Feedback Mechanism

First, the evaluation method is single. When evaluating students' learning effectiveness, the traditional teaching evaluation system overemphasizes final exams and written reports, giving too much weight, while relatively ignoring the comprehensive evaluation of students' practical ability, innovation ability and teamwork ability. The second is the lack of effective feedback. In the process of learning, students generally lack immediate and effective feedback from teachers and peers, which makes it difficult for students to accurately grasp their learning status and progress space, thus weakening their learning motivation and affecting their learning effect.

3. Teaching Reform Programs and Ideas

Based on the in-depth analysis of the above problems, combined with the talent training mode of application-oriented universities, we intended to integrate the concept of a slow-moving system and barrier-free design into the curriculum system of urban planning system engineering, mainly focusing on three aspects: the frontier guidance of teaching content, the innovation drive of teaching methods and the construction and improvement of evaluation feedback mechanism. It is necessary to track industry trends, ensure that the teaching content is always close to the pulse of the times, and stimulate students' interest in learning and desire to explore. We should be brave to innovate teaching methods, emphasize the close combination of theoretical teaching and practical links, stimulate students' active learning willingness and deep thinking ability through rich case analysis and field research, and improve students' comprehensive quality and practical operation ability in an all-round way. In addition, it is necessary to build a scientific and rigorous evaluation and feedback system to accurately measure the teaching effect and adjust the teaching strategy in time to ensure the continuous optimization of teaching quality and student development.

3.1 Leading the Forefront of Teaching Content

In order to improve the teaching quality and effect, optimizing the teaching content is the key. One is to delete the redundancy and integrate it into the hot spot. The repeated and outdated contents are deleted, and hot topics such as new thoughts, new theories and new technologies in urban and rural planning are added. Closely combined with social reality, especially the frontier research and practical cases related to slow traffic systems and barrier-free design, the timeliness and practicability of teaching content are ensured. Second, the topic is deepened and the practice is strengthened. Establish thematic modules such as 'slow traffic planning' and 'barrier-free design' to enhance the depth and systematicness of learning; add research hours, encourage students to conduct research and analysis and improvement plan discussions on the slow-moving system and barrier-free facilities in their cities in groups, apply theoretical knowledge to urban practical problems, strengthen the integration of theory and practice, and improve the ability to solve practical problems.

3.2 The Innovation Drive of Teaching Methods

In order to improve the teaching effect, reshape the learning experience, and change the traditional inertial thinking of "teaching before learning" and the relationship between teachers and students, the following three measures can be taken. The first is to innovate the teaching mode and integrate the comprehensive mode of guidance, assistance and promotion. In the course of slow-moving systems and barrier-free design, students are guided to learn independently by providing rich literature cases, help students solve problems through group discussion and project guidance, and stimulate innovative thinking and practical ability through design competitions and actual projects. This model can not only

enhance the interaction between teachers and students, but also stimulate students' interest in the fields of slow systems and barrier-free design.

The second is to embrace new technologies and innovate teaching methods. Through the use of online teaching platforms such as MOOC and Rain Classroom in Chinese universities, the whole chain learning of pre-class preview, in-class interaction and feedback, and after-class consolidation and expansion is realized. In the course of the slow walking system, students are asked to preview relevant videos and literature before class. In the course, virtual reality technology is integrated to simulate the design and implementation scenarios, carry out vivid interactive learning, and discuss and submit homework after class to consolidate and expand knowledge.

The third is to build characteristic resources and enable autonomous learning. Combined with the characteristics of the slow system and barrier-free design, a series of characteristic teaching resources including video tutorials, VR (virtual reality) cases and interactive experiments are created. For example, make a case video of barrier-free design to showcase excellent examples of barrier-free design around the world; develop a virtual experiment of the slow-moving system, so that students can design and simulate it in a virtual environment. These characteristic resources not only enrich classroom teaching, but also provide support for students' personalized autonomous learning needs.

3.3 Construction and Improvement of Evaluation Feedback Mechanism

Teaching assessment is an important part of course teaching. According to the characteristics of urban planning system engineering, a diversified evaluation and feedback mechanism is established to better evaluate students' comprehensive ability and practical application ability.

The first is to build a diversified evaluation system to comprehensively consider students' abilities. In the course, the classroom interactive teaching link should be appropriately increased, the subjective initiative of students' learning should be brought into play, and the proportion of daily learning assessment should be increased, covering usual performance, project practice and classroom participation. Through phased assignments, group projects and classroom discussions, students' learning progress is continuously tracked, which not only evaluates knowledge mastery, but also pays attention to practical application and teamwork ability.

The second is to improve the immediate and effective feedback mechanism to help students continue to grow. Use online teaching platforms and classroom interaction to provide real-time personalized feedback to students. Teachers' real-time demonstration, question-answering guidance, organization program display and collective discussion promote multi-angle learning improvement. In addition, the feedback time is reserved at the end of the course, the teacher summarizes the performance, points out the problems, and puts forward targeted improvement suggestions to promote teaching and learning.

4. The Design of Teaching Activities based on the Concept of Slow System and Barrier-free Design

4.1 Teaching Cases

As the core area of education and activities, the campus's slow-moving system and barrier-free facilities directly affect the convenience and safety experience of each teacher and student. This teaching took the investigation of the slow traffic system and barrier-free facilities on the campus of North China University of Technology as a teaching case. Through field investigation, data analysis and scheme design, students' understanding of slow traffic systems and barrier-free design concepts was deepened, and their practical operation ability was tempered (Table 1).

Table 1: Teaching content and teaching requirements table

Course links	*course content*	*curriculum requirements*
identification problem	Through field research, the current situation and existing problems of slow traffic systems and barrier-free facilities on campus are identified.	Use measurement tools (e.g., rangefinder, tape, etc.) to collect physical data (e.g., slope, width, height) of facilities. Collect user satisfaction and suggestions on existing slow traffic systems and accessible facilities through interviews or questionnaires.
data collection and analysis	Collect data on slow-moving systems and barrier-free facilities and analyze them to find design flaws and room for improvement.	Use charts and statistical software to analyze the collected data and identify design defects. Assess existing facilities to meet regulatory requirements against existing standards and regulations
conceptual design	Based on the results of the investigation and analysis, an improvement scheme is proposed.	Proposing specific suggestions for improvement and using drawings and models to demonstrate new designs
enhance skills	Improve students' practical ability and teamwork spirit	According to the feedback of teachers and students, further improve the design scheme. Reflect on the experience and lessons in the process of investigation, and put forward the future improvement direction.

The research scope included the main buildings, roads, entrances and exits, and public facilities (such as libraries, canteens, dormitories, teaching buildings, etc.) of the campus. Each group was composed of 4-5 students, and the division of labor within the group was clear. Wrote a detailed research report, including research background, methods, findings, analysis, design and conclusions. Prepared a 10-minute demonstration to show the research results and design plans to the class and teachers, the specific assessment requirements are shown in Table 2.

Table 2: Results assessment requirements table

content of assessment	*focus of assessment*	*percentage*
Depth and accuracy of research	Comprehensiveness and accuracy of data collection, accuracy of problem identification	30%
Ability to analyze and design	The depth of data analysis, the innovation and the feasibility of the design scheme	30%
Team cooperation and organizational ability	Team collaboration efficiency, division of labor and cooperation	20%
Report quality and display effect	The logicality and completeness of the report, the clarity and persuasiveness of the presentation	20%

Figure 2: Campus slow traffic system research results map

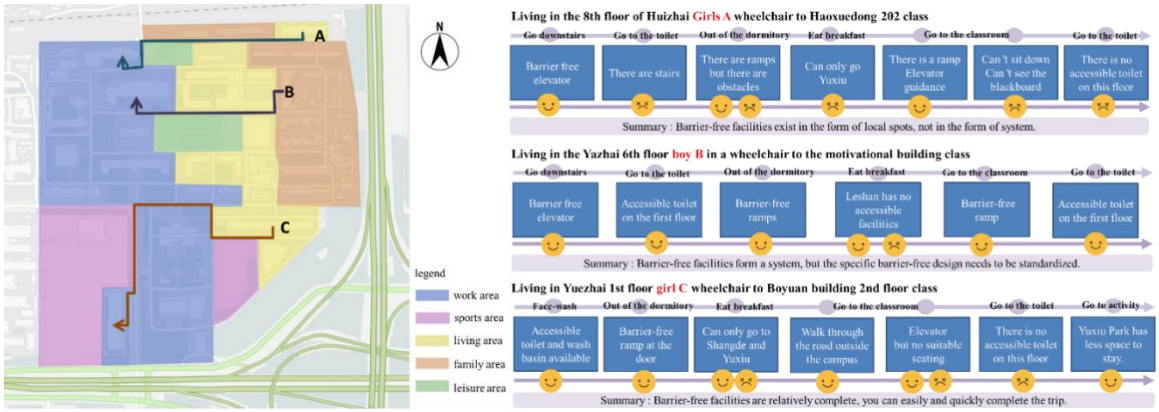

Figure 3: Survey results of campus barrier-free facilities

4.2 Teaching Effect

The students actively participated in the course and were enthusiastic. Team cooperation tacit understanding, each director. In the research stage, students observed and measured the slow traffic system and barrier-free facilities on campus in detail, and collected a lot of valuable feedback information through various forms such as interviews and questionnaires. In the stage of data analysis and scheme design, students flexibly used the knowledge learned in the classroom and put forward a series of creative and operable design schemes in combination with the on-site situation.

After the course, through questionnaire survey and classroom feedback, students generally believed that this practice greatly improved their cognition and application ability of slow-moving systems and barrier-free design, with remarkable results. The local display of students' homework is shown in Figure 2 and Figure 3.

5. Conclusion

This paper attempted to carry out innovative reform on the teaching of urban planning system engineering courses by integrating the concept of slow-moving systems and barrier-free design. From the aspects of optimizing the frontier guidance of teaching content, the innovation drive of teaching methods and the construction and improvement of evaluation feedback mechanism, the teaching quality and effectiveness were improved in many dimensions. These initiatives not only enhance the attractiveness and practicality of the course, but also effectively stimulate students' enthusiasm for learning and innovative potential. In the future, we will continue to deepen the teaching reform, explore innovative teaching methods and contents, improve the teaching quality of the course, and further cultivate students' practical ability to use system engineering in urban planning.

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