Research on the "IISP" Undergraduate Talent Training Mode of Civil Engineering Majors in Local Universities Driven by Digital Intelligence: A Case Study of Hunan University of Arts and Science

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Abstract: Against the backdrop of the rapid development of digital and intelligent technologies today, local universities' civil engineering majors are facing new opportunities and challenges. In order to meet the needs of the times and cultivate high-quality and innovative civil engineering talents, Hunan University of Arts and Science actively explores the undergraduate talent training mode of "IISP" (Ideological and Political Education Integration, Interdisciplinary Integration, Specialized Education and Entrepreneurship Integration, Post Linkage) driven by digital and intelligent technologies. This paper deeply analyzes the connotations and significance of this mode, elaborates in detail on its specific implementation strategies, including the specific paths of ideological and political education integration, curriculum setting and teaching methods of interdisciplinary integration, construction of the practice system of specialized education and entrepreneurship integration, and specific measures of post linkage. Taking the practice of Hunan University of Arts and Science as an example, through specific teaching cases, it explores the achievements, existing problems and corresponding improvement strategies in the implementation process of this mode, aiming to provide useful references for the talent training of civil engineering majors in local universities.

***Keywords*:** Digital and intelligent technology; Local universities; Civil engineering majors; "IISP" talent training mode

1. Introduction

With the rapid development of information technology and the accelerated promotion of digitalization and intelligent transformation, the demand for professional talents in various industries has undergone profound changes. In the construction industry, the application of digital and intelligent technologies such as Building Information Modeling (BIM), Virtual Reality (VR), and Artificial Intelligence is becoming more and more widespread. It requires civil engineering majors not only to have solid professional knowledge and skills but also to have interdisciplinary comprehensive qualities, innovative spirit and entrepreneurial ability, as well as good ideological and political qualities and job adaptation ability. As an important force in supporting local economic and social development, the talent training mode of civil engineering majors in local universities urgently needs to be reformed and innovated. Hunan University of Arts and Science, as a local comprehensive university with a relatively high level, actively explores the "IISP" undergraduate talent training mode of civil engineering majors driven by digital intelligence, and has carried out beneficial practices and explorations in cultivating high-quality civil engineering majors who meet the needs of the times.

2. Connotations and Significance of the "IISP" Talent Training Mode

2.1 Connotations

As Hunan Province has been approved by the Ministry of Education as a pilot province for Education Informatization 2.0, the School of Civil Engineering and Architecture of Hunan University of Arts and Science has also begun the practice and exploration of Education Informatization 2.0, and proposed the "IISP" undergraduate talent training mode of civil engineering majors in local universities driven by digital intelligence, including four major systems: Ideological and Political Education Integration, Interdisciplinary Integration, Specialized Education and Entrepreneurship Integration, and Post Linkage. By constructing a "3 majors + 4 cores + 5 modules" curriculum system and promoting a "3 stages + 2 means" whole-process digital-intelligent teaching method, and developing a "4 new" dynamic assessment system of school-local joint, it continuously promotes the synergy between talent training in local universities and social services. It aims to better meet the requirements of in-depth transformation and development of civil engineering majors and the needs of serving local economic and social development by improving the quality of talent training in civil engineering majors.

Ideological and Political Education Integration: Integrate ideological and political education throughout the whole

process of talent training in civil engineering majors. By exploring the ideological and political elements in civil engineering major courses, organically integrate ideological and political education with professional education to achieve the organic unity of value shaping, ability cultivation and knowledge imparting.

Interdisciplinary Integration: Break the traditional disciplinary barriers of civil engineering majors and promote the interdisciplinary integration between civil engineering majors and other related disciplines such as computer science, management, and economics, so as to cultivate students' interdisciplinary thinking and the ability to comprehensively use knowledge to solve practical problems.

Specialized Education and Entrepreneurship Integration: Integrate innovation and entrepreneurship education into the whole process of civil engineering major education, cultivate students' innovative consciousness, entrepreneurial spirit and entrepreneurial ability, so that students have the ability to discover market opportunities, innovate business models, and organize resources to implement entrepreneurial projects.

Post Linkage: Emphasize the close connection between talent training and the actual job requirements of civil engineering industry enterprises, so that students can understand the actual working environment and job requirements of industry enterprises during their university years, and improve their practical operation ability, professional quality and job adaptation ability.

2.2 Significance

The "IISP" talent training mode driven by digital intelligence is of great significance to civil engineering majors in local universities. It can cultivate high-quality innovative talents who meet the needs of the digital intelligence era, improve the teaching level and talent training quality of civil engineering majors in local universities, and promote the in-depth integration of local universities and local economy.

3. Specific Implementation Strategies of the "IISP" Talent Training Mode

3.1 Implementation Strategies of Ideological and Political Education Integration

Construction of the Ideological and Political Education Curriculum System: Clearly define the ideological and political education goals and requirements in the curriculum system of civil engineering majors, and explore the ideological and political elements in professional courses. For example, in courses such as "House Building" in civil engineering majors and "History of Chinese Architecture" in urban and rural planning majors, through telling the wisdom of ancient Chinese architectural structures, such as mortise-and-tenon joints, cultivate students' cultural confidence and craftsmanship spirit.

Construction of the Ideological and Political Education Teacher Team: Strengthen the training of teachers' ideological and political education ability and encourage teachers to carry out innovative research on curriculum-related ideological and political education methods. For example, organize teachers to participate in ideological and political education training seminars and conduct collective lesson-planning activities.

Improvement of the Ideological and Political Education Evaluation Mechanism: Establish a scientific and reasonable curriculum-related ideological and political education teaching evaluation mechanism and incorporate students' ideological and political qualities into the comprehensive quality evaluation system of students.

3.2 Implementation Strategies of Interdisciplinary Integration

Design of the Interdisciplinary Curriculum System: Integrate the knowledge and resources of civil engineering majors and related disciplines and construct an interdisciplinary curriculum system. For example, offer interdisciplinary courses and experimental training in the field of intelligent construction, covering contents such as intelligent building design, construction management, and data analysis.

Construction of the Interdisciplinary Teaching Team: Select excellent teachers with different disciplinary backgrounds to form an interdisciplinary teaching team and jointly carry out curriculum design and teaching practice. For example, in the intelligent construction course, teachers from civil engineering, architecture, computer science, and automation cooperate to teach.

Construction of the Interdisciplinary Practice Platform: Cooperate with industry and enterprise to establish an interdisciplinary practice platform, such as an intelligent construction laboratory, to provide students with conditions for experiments, practices, and scientific research.

3.3 Implementation Strategies of Specialized Education and Entrepreneurship Integration

Reform of the Innovation and Entrepreneurship Curriculum System: Improve the innovation and entrepreneurship curriculum system of civil engineering majors and set up innovation and entrepreneurship courses at different levels. For

example, set up basic entrepreneurship courses, entrepreneurship practice courses, and entrepreneurship expansion courses in the entrepreneurship education curriculum system.

Construction of the Innovation and Entrepreneurship Practice Platform: Build an innovation and entrepreneurship practice platform, such as an entrepreneurship incubation base, to provide students with places and resources for innovation and entrepreneurship practice.

Construction of the Innovation and Entrepreneurship Mentor Team: Form an innovation and entrepreneurship mentor team to provide students with innovation and entrepreneurship guidance and consulting services.

3.4 Implementation Strategies of Post Linkage

Establishment of the Industry-Education Integration Cooperation Mechanism: Establish a close cooperative relationship with civil engineering industry and enterprises, jointly formulate talent training plans, carry out curriculum construction, and build practical teaching bases, etc.

Optimization of the Practical Teaching System: Optimize the practical teaching system of civil engineering majors according to the job requirements of civil engineering industry and enterprises and increase the proportion of practical teaching.

Construction of the Employment and Entrepreneurship Service System: Establish and improve the employment and entrepreneurship service system of civil engineering majors, and provide students with services such as employment guidance, entrepreneurship training, and career planning.

4. Practice Cases of the "IISP" Talent Training Mode: Taking Hunan University of Arts and Science as an Example

4.1 Practice of Ideological and Political Education Integration

Integrate ideological and political elements into course teaching. For example, in the course "Seismic Design of Building Structures" in civil engineering majors, teachers combine the spirit of unity and cooperation and heroic deeds shown by China in earthquake relief in recent years, such as the touching deeds in the Wenchuan Earthquake and the Yushu Earthquake, to guide students to discuss the importance of seismic design of building structures, cultivate students' social responsibility and sense of responsibility. At the same time, incorporate the ancient Chinese architectural seismic wisdom, such as the seismic structure design of the Wooden Pagoda in Ying County, Shanxi, into the course, so that students can feel the wisdom and creativity of ancient ancestors and stimulate students' cultural confidence.

4.2 Practice of Interdisciplinary Integration

Civil engineering majors and relevant majors in the school jointly carried out the theoretical and practical courses of "Based on BIM Technology". In the course and practical teaching, civil engineering students are responsible for learning knowledge about building engineering design and construction technology, while students from relevant majors provide support in aspects such as BIM software technology and intelligent control. For example, in a virtual building project simulation, students from the two majors form a team to jointly complete a series of tasks from building design, model construction to construction process simulation and optimization. Through this interdisciplinary cooperation, students not only master the application of BIM technology in building engineering but also cultivate interdisciplinary collaboration ability and the ability to solve practical problems.

4.3 Practice of Specialized Education and Entrepreneurship Integration

Actively guide students to participate in college student innovation and entrepreneurship competitions. Combining civil engineering professional knowledge and digital and intelligent technologies, a series of smart civil engineering innovation and entrepreneurship projects integrating civil engineering, Internet of Things, and artificial intelligence have been proposed. These projects aim to collect environmental data inside and outside buildings through Internet of Things sensors, use artificial intelligence algorithms for data analysis and processing, and realize functions such as intelligent energy-saving management, safety monitoring, and facility maintenance of buildings. In the project practice process, students not only exercise their innovative ability and entrepreneurship practical skills but also cultivate team-cooperation spirit and market analysis ability. Eventually, this project achieved excellent results in the innovation and entrepreneurship competition and was further incubated and promoted in enterprises.

4.4 Practice of Post Linkage

The school and enterprises carry out "school-enterprise cooperation" and establish a "3 + 1" talent training mode.

Students study professional knowledge and skills in schools for the first three years and enter cooperative enterprises for internships in the fourth year. For example, cooperating with a large-scale construction enterprise, students are arranged to participate in the project design and construction management work of the enterprise. During the internship, students participate in actual projects, such as the building design stage of a large-scale commercial complex project. Students use the civil engineering professional knowledge they have learned and, under the guidance of enterprise mentors, assist in completing the design and optimization of the building plan. At the same time, the enterprise provides students with professional quality training and post-practice guidance to help students understand the corporate culture and management process and improve students' professional quality and job adaptation ability.

Acknowledgments

Fund Projects: Key Project of Teaching Reform Research in Ordinary Higher Education Institutions in Hunan Province in 2021 "Exploration and Practice on Cultivation of Innovative Practice Ability of Civil Engineering Majors in Local Universities under the Background of New Engineering" (HNJG-2021-0165); Innovation Science and Technology Team of Hunan University of Arts and Science "Urban and Rural Land Space Planning and Construction in Pan-Northwestern Hunan Region" (University Office Announcements [2020] No. 26); First-class Applied Characteristic Cultivation Discipline of Hunan University of Arts and Science "Urban and Rural Planning" (University Office Announcements [2022] No. 18).

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