DEVELOPING A TEACHING MODEL BASED ON A SIMULATION COMPANY IN ORDER TO IMPROVE THE WORKING ABILITY OF ENVIRONMENTAL DESIGN STUDENTS IN XINXIANG CITY, HENAN PROVINCE, CHINA

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This study aims to analyze the current state of environmental design education in Xinxiang City, Henan Province, China, and to develop and evaluate a teaching strategy based on a simulated company teaching model to enhance students' professional competencies. The research process was divided into three phases: investigation and analysis of the current situation, model development, and model validation. The study subjects consisted of all undergraduate students majoring in environmental design from five universities in the region, with a total population of 1,312 and a final valid sample size of 518. A mixed-methods approach was adopted, combining literature review, questionnaire surveys, interviews, and focus group discussions. The research followed six steps: problem identification, determination of key teaching points, teaching model development, collection of feedback, model optimization, and finalization of the model. Data were collected through questionnaires, interviews, and other methods, and were processed using statistical analysis. The findings reveal that the environmental design industry in Xinxiang faces dual challenges: difficulty in enterprise recruitment and student employment. The current curriculum design fails to align with industry needs or meet market demands, highlighting an urgent need to develop a teaching model that aligns with enterprise requirements and enhances students' professional abilities. Following focus group discussions, both the suitability and feasibility of the final model received the highest ratings (100%; mean $\bar{x}$ = 5.0, standard deviation SD = 0.0 for both). The results of this study establish an instructional design model based on a simulated company, which effectively enhances students' professional abilities through project-based practices. This model provides a practical solution to bridge the gap between education and real-world practice.

Keyword : Environmental Design, Simulated Company, Teaching Model, working ability

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CHAPTER 1
INTRODUCTION

Background

The employment and unemployment issues among youth and college students have become a global challenge. It is crucial to accurately grasp the current employment situation and the current state of work capabilities of graduates(Xin, 2021). The International Labour Organization predicted in its report "World Employment and Social Outlook: Trends 2024" that the prospects for the labor market and global unemployment will deteriorate. It is expected that by 2024, an additional 2 million job seekers will emerge globally, pushing the unemployment rate from 5.1% in 2023 to 5.2%. Disposable income has decreased in most countries, and the standard of living decline due to inflation is unlikely to recover in the short term(Organization, 2024).

We are in a new developmental stage known as the BANI era, where the environment has become more fragile, susceptible to unpredictable disruptions and threats, with increasing uncertainty and insecurity(Guangming, 2023). The process of global development is no longer linear but exhibits complex relationships and feedback mechanisms. The emergence of new technologies and challenges makes the regularity of development hard to grasp, and we feel unable to predict the direction and outcomes of events based on past experiences. In this rapidly changing era, we face countless challenges and opportunities. Significant changes in social structures and employment environments have occurred, and individuals can no longer passively accept changes but should actively participate and prepare to adapt to this era. The rise of emerging industries and the decline of traditional industries have complicated the issue of employment. With global economic fluctuations and rapid technological development, many countries are facing difficulties in youth employment. Particularly against the backdrop of the rise of emerging industries and the decline of traditional ones, global economic instability, social structural changes, and the disconnection between the education system and the job market have exacerbated the severity of this problem(Xuying, 2022).

The United Nations, in its "World Youth Report: Youth and the 2030 Agenda for Sustainable Development" published in February 2019, emphasized two points: first, it called on countries to provide youth with the necessary skills for employment and entrepreneurship; second, it advocated strengthening vocational training and skill development to address issues such as youth unemployment rates, underemployment rates, vulnerable employment rates, informal employment rates, and non-employment rates. Deputy Director-General for Policy at the International Labour Organization, Martha Newton, noted, "The pandemic crisis has revealed some shortcomings in addressing the needs of youth, especially first-time job seekers and inexperienced recent graduates." She emphasized, "What young people need most is a well-functioning labor market that provides decent work opportunities for those already in the labor market and quality education and training opportunities for those not yet in the labor market." "Employment is the foundation of people's livelihood," and college student employment carries extremely high social and family expectations, affecting thousands of families. Therefore, taking effective measures is an urgent task we must face(DESA, 2019).

The relationship between people, architecture, and the environment has become an important topic of contemporary global concern. The Chinese government has issued several related documents from 2012 to 2024. The United Nations' "World Economic Situation and Prospects 2024" report points out that persistent high interest rates, escalating conflicts, weak international trade, and increased climate disasters pose significant challenges to global growth. The report anticipates that global economic growth will slow from 2.7% in 2023 to 2.4% in 2024, below the pre-pandemic growth rate of 3%. The report states that China's economic recovery faces resistance. In 2023, its GDP is estimated to have grown by 5.3%, showing some recovery; however, due to the sluggish real estate sector, weakened external demand, and tense trade situations, the growth rate may slow down to 4.7% in 2024(UN, 2024). The New York Times reported that China's housing sales in 2023 fell by 6.5% year-on-year. China faces dual pressures of post-pandemic and economic challenges, leading to significant

changes in the construction and real estate industries. The environmental design major, being a downstream industry, is affected by the volatility of market demand for design services, with fierce industry competition and prominent employment issues among college students. It gradually permeates our surroundings, subtly influencing us. The level of industry development has an undeniable impact on society, urban planning, and public and living spaces. Only cities or residential areas with a good environment can better achieve the dual value of material and spirit, directly relating to people's daily lives and future sustainable development, pushing designers towards more humanized and sustainable design directions, committed to creating livable environments in harmony with nature(Wakabayashi & Fu, 2024).

The Chinese government highly values the employment issue of college students, regarding it as an important part of the national strategy. From 2012 to 2023, the government has issued a series of policy documents aimed at promoting college student employment and entrepreneurship to meet the needs of socio-economic development. On November 14, 2022, the Ministry of Education of China issued the policy document "Promoting College Student Employment with High-Quality Internships," mentioning: (1) Participating in internships and practice is of great significance for college students. On one hand, engaging in high-quality internships helps increase practical experience among college students, better linking theory with practice, thus promoting students' learning achievements and application(China, 2022). (2) Participating in high-quality internships helps college students establish professional connections, enhance employment competitiveness, and lay a solid foundation for long-term career development. The policy points out the significant role of practical internships for college students, promoting practical experience, theoretical application, professional connections, and competitiveness, aiding in long-term career advancement. In the same year, the Ministry of Education's "Notice on Doing a Good Job in Employment and Entrepreneurship of College Graduates in 2023" discussed that talent is the first resource, implementing an employment-first strategy to promote high-quality and full employment. College graduates are a valuable talent resource for the country

and an important group in promoting employment. Colleges and universities across the country should take employment education and guidance as an important part of "three-dimensional education", carry out in-depth employment-themed education, guide graduates to maintain a realistic mindset, objectively view personal conditions and social demands, and choose careers and job positions based on reality. Colleges and universities should improve and perfect a phased, comprehensive career planning and employment guidance system for college students(China, 2023).

With the popularization of higher education, the number of college graduates has been increasing annually, reaching 11.58 million in China in 2023. This growth trend has led to fiercer competition in the job market. In this context, college students must enhance their work capabilities and competitiveness to stand out among many job seekers. This enhancement is not only to meet current employment challenges but also to adapt to future workplace needs(Ltd., 2023). China, the world's second-most populous country, has Henan Province as its most populous province. According to data released by the National Bureau of Statistics of China: in 2023, there were 10.47 million college graduates in China, an increase of 820 thousand compared to the previous year(NBS, 2024). The Henan provincial government held a press conference announcing that the number of graduates in Henan reached 87 ten thousand in 2023(HBS, 2023). The China Education Daily reported in 2023 that as a major province in terms of population in China, Henan has seen a steady rise in the scale of college graduates year after year, leading the nation for four consecutive years. The employment situation for college graduates is complex and severe, with immense pressure(Ministry of Education, 2023b). Governor Wang Kai of Henan Province stated, "College student employment is a significant livelihood task, requiring precise policy implementation, focusing on building platforms, expanding channels, cultivating market entities, and guiding education, to ensure high-quality employment work for college students through the joint efforts of all parties.(Ministry of Education, 2023a).

Xinxiang City in Henan Province currently has 12 universities with over 200 thousand college students. In 2023, the number of graduates reached 57,400, with both

the number of universities and graduates ranking at the top in Henan Province. The Xinxiang municipal government has introduced multiple active and dedicated policies to assist college student employment. Previously, the environmental design major at Xinxiang University was a popular choice among students, but now there is a decline in the application rate and issues with changing majors. Students are experiencing reduced employment expectations, lack of stability, and mismatches between their majors and job positions, leading to poor employment quality.(Government, 2024)"

In recent years, influenced by the downturn in the real estate industry and other factors, the design service industry has weakened, and the once booming enrollment and employment status of the environmental design major has reached a clear turning point. The environmental design major is a highly practical field, requiring students to have a high level of design practice(Acker & Bailey, 2011). For new graduates with no work experience, adapting from the campus environment to the workplace is a huge challenge, including not only the development of professional skills but also the adaptation in interpersonal relations and psychological construction. Students need to master professional skills and also possess innovation capabilities and practical experience to adapt to the ever-changing industry environment(Van Acker & Bailey, 2011). However, enterprises, primarily focused on production and operations, cannot provide a long adaptation and trial-and-error period for new graduates. This leads to a vicious cycle of difficulty for enterprises to recruit competent employees and for new graduates to find suitable jobs. Therefore, the quality of university education is crucial for students' employment prospects(Kärnä-Behm, 2016).Solving the employment issues of youth and college students requires joint efforts from the government, enterprises, educational institutions, and all sectors of society to provide more pre-professional training, internship opportunities, and entrepreneurial support, as well as to formulate more flexible and adaptable employment policies and institutional mechanisms to help young people better adapt to changes in the job market and achieve their career development and social value(Alawad, 2021).

At present, both globally and in China, there is close attention to the issues of youth employment and capability development, especially in the environmental design industry, which poses new requirements for university education. This study holds significant importance for China's environmental design industry and education sector as it relates to how to better prepare students to meet industry demands. By developing a simulated company teaching model for environmental design courses, higher education institutions in China, particularly universities in Xinxiang, Henan, can cultivate graduates who better meet market demands; universities can train graduates who can more fully meet the requirements of the design industry, which is not only beneficial for students' personal growth but also meets the recruitment needs of forward-thinking employers(Dang et al., 2023). Additionally, this study may provide valuable insights for universities in China and globally that are actively seeking to develop simulated company teaching models to advance environmental design courses. Innovative teaching methods can effectively enhance the work capabilities of students majoring in environmental design, bringing a win-win situation for both the education sector and the industry.

Objectives of the study

This study had the following objectives:

1. To study the state and problem of environmental design major in Xinxiang, Henan, China

2. To develop a teaching model of environmental design for capacity building for a university in Xinxiang, Henan Province, China.

3. To Confirm the curriculum of environmental design to enhance competency for the university in Xinxiang, Henan, China.

Research Questions

This study is designed to answer the following research questions:

1.What is the current situation and what issues exist in the environmental design major in Xinxiang City, Henan Province?

2.What kind of teaching models can improve the competence of environmental design students in Xinxiang, Henan Province?

3.Can the simulation company modeling teaching of environmental design major in Xinxiang City, Henan Province, improve students' abilities?p

Significance of the study

1.The study can be used to address the status and problems of environmental design programs in Xinxiang City, Henan Province, China.

2. The study can be used to develop an environmental design program to improve the capacity of Henan Xinxiang City College.

3. This study can be used to improve the competence of students in Xinxiang, Henan Province by utilizing an environmental design teaching model.

Research Hypothesis

The hypothesis states that this study has the potential to improve the work ability of college students majoring in environmental design. Through the development of this teaching model, the acquisition of knowledge and the development of comprehensive abilities in the learning process, graduates can realize their career aspirations and meet the needs of society.At the same time, they have the potential to improve their ability to realize their value in society, with the ability to work. They also have the potential to improve their ability to realize their value in society, with innovative and entrepreneurial skills.

Scope of the Study

This study aims to improve the working ability of environmental design students in Xinxiang City, Henan Province.Scope of the study: by finalizing the 1st-4th grade students majoring in environmental design in five universities in Xinxiang City, Henan Province as the main research object.

Research benefits.

1.The study can be used to address the current status and problems of environmental design programs in Xinxiang City, Henan Province, China.

2. The study can be utilized to develop an teaching model of environmental design to improve the capacity of universities in Xinxiang, Henan Province.

3. The study could be used to develop an environmental design teaching model to enhance the capabilities of students in Xinxiang, Henan Province.

Definition of terms

To ensure clarity and professionalism in the study, the following professional terms and definitions used in this research are explained:

1. Environmental Design: also known as artistic or environmental art design, is a crucial aspect of human habitat design. It focuses on the research and practice of creating indoor and outdoor living environments, primarily expressed through architectural, landscape, interior, and spatial design. As an interdisciplinary field bridging art and science, it aims to harmonize the "people-architecture-environment" relationship to form cohesive and pleasant human activity spaces. The study subjects are environmental design majors at universities in Xinxiang City, Henan Province.

2. Simulated Company Teaching Method:This is an interactive and immersive learning approach that provides opportunities for learning and practice by simulating real business environments. It allows participants to experience the complexities and challenges of business operations without real-world risks. It is a problem-solving-based learning technique. In this study, the teaching model is designed by integrating the characteristics of environmental design with the operational procedures of a simulated company.

3. Teaching Model:A teaching model refers to a stable framework and operational procedure for teaching activities formed under the guidance of specific pedagogical theories. It emphasizes overall structure and the relationships among elements, focuses on order and operability, provides a theoretical methodological system for instruction across disciplines, and helps teachers move beyond experiential teaching to build a bridge between teaching theory and practice.

4.Design Company:A design company aims to provide innovative design solutions to meet market demands, assist clients in achieving commercial and creative goals, and offer professional technical support and services. Its operations typically involve close collaboration with clients, covering the entire process from market and user research to design implementation and evaluation. In this study, the term specifically refers to enterprises specializing in environmental design services.

5. Students' Work Ability:In the context of this research, work ability refers to the knowledge, skills, and behavioural attributes necessary for students to perform effectively in future professional roles. This study emphasizes five core abilities as defined below:

(1) Communication Ability: The capacity to effectively exchange information and collaborate with teammates, clients, and instructors within a simulated company environment, including skills in expression, active listening, and adaptive interaction.

(2) Innovation and Entrepreneurship Ability: The capability to propose creative solutions, identify and assess market opportunities, and mobilize resources to realize project goals within simulated design tasks.

(3) Practical Ability: The proficiency to apply acquired knowledge and technical skills from environmental design to real-world contextual tasks, execute operational processes, and solve concrete problems.

(4) Career Adaptability: The readiness to adjust psychologically and behaviourally in response to changing role expectations, task requirements, and simulated workplace conditions.

(5) Employability: The overall capacity—comprising occupational skills, market responsiveness, and potential for sustainable development—gained through the “simulated company” experience to meet the demands of the environmental design industry.

6. Capstone Courses:Capstone courses are comprehensive practical courses delivered in the final phase of undergraduate education, requiring students to synthetically apply professional knowledge and skills to complete authentic projects. This study incorporates this educational concept to establish a simulated-company-

based teaching activity focused on environmental design projects. It is intended to help students integrate undergraduate knowledge, improve comprehensive practical ability, and facilitate the transition to career or advanced academic development. These courses serve not only to develop knowledge integration skills but also as vital preparation for professional practice or further studies.

Conceptual Framework

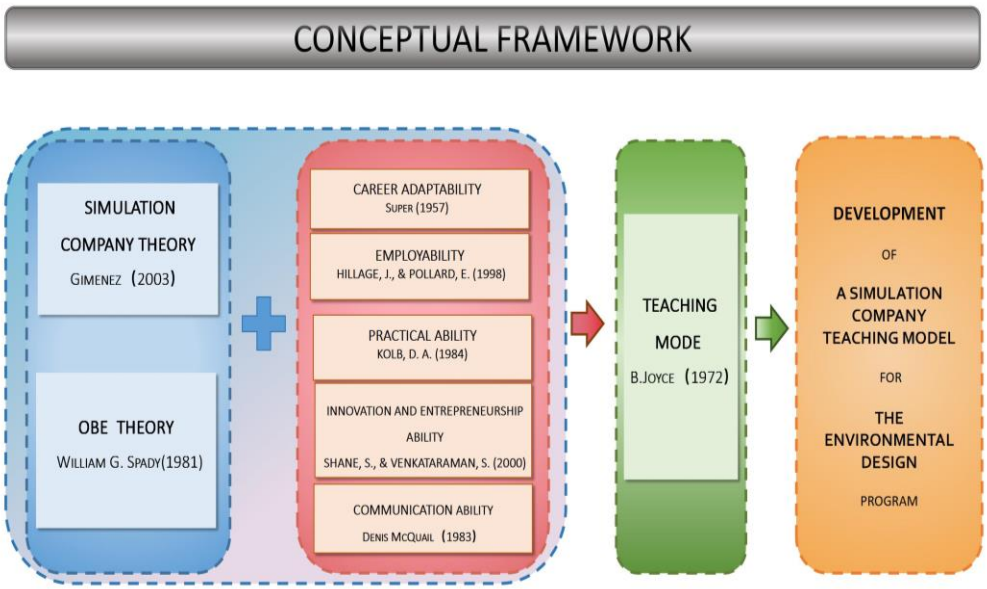

Figure 1 Conceptual Framework

Source: Zhao Yajun

Research Framework

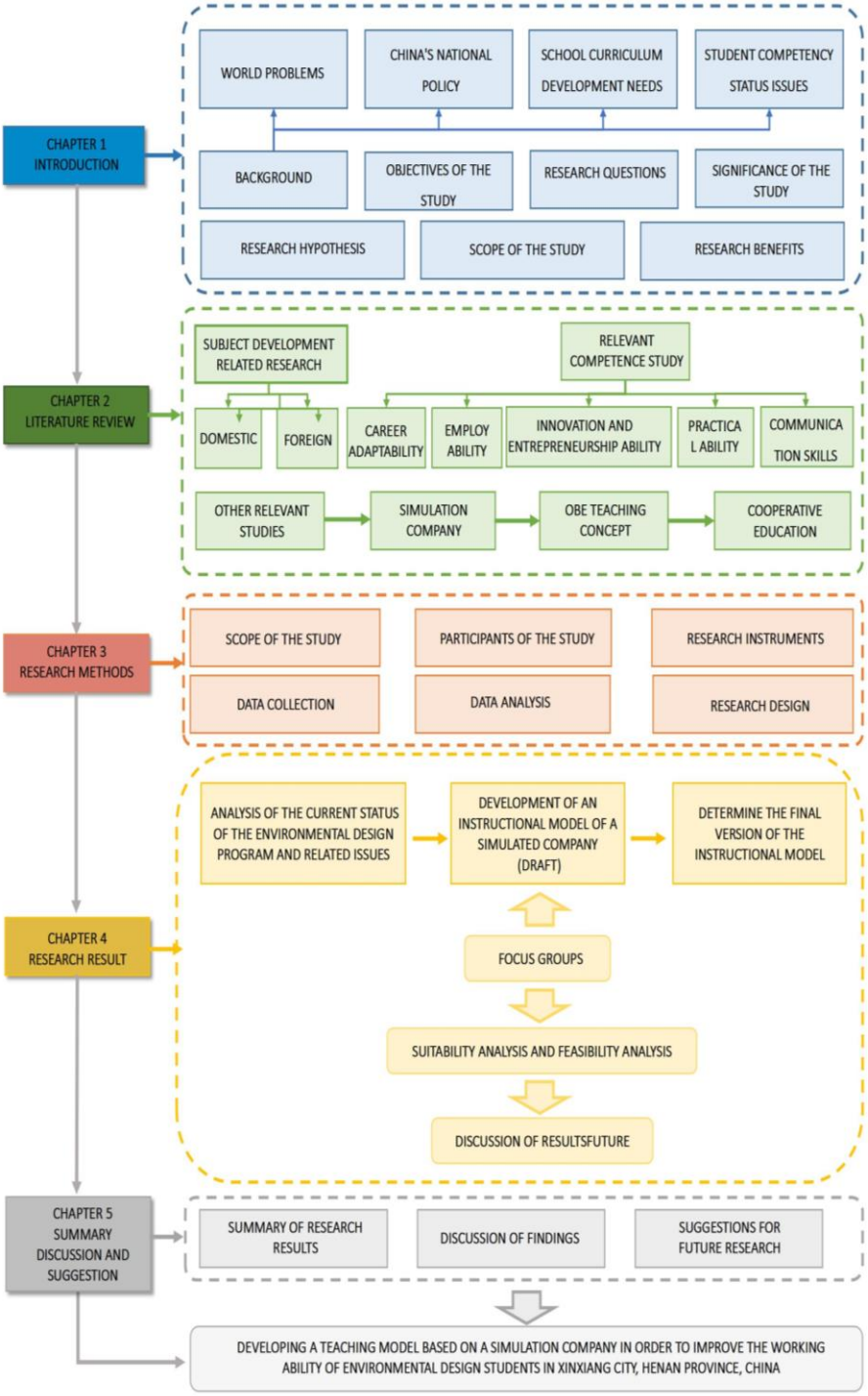

Figure 2 Research Framework

Source: Zhao Yajun

CHAPTER 2
LITERATURE REVIEW

This study aims to develop a simulated company teaching model for the environmental design major in universities of Xinxiang City, Henan Province, China, to enhance students' work capabilities. Therefore, we reviewed relevant literature and research to gain sufficient background knowledge. This chapter can be divided into the following 5 parts:

1.Studies related to the development of the environmental design profession

2.Studies related to the working ability of environmental design majors

3.Research Related to the Teaching Model of Simulated Company

4. Theoretical Basis for Developing Teaching Models

The evolution of the environmental design major in China has spanned over a decade. Originating from interior design, its development has been a continuous subject of academic discussion. This literature review aims to comprehensively examine the development of the environmental design major and the innovation of its teaching models. The research begins with an analysis of the development and current state of the environmental design major, divided into Chinese and international dimensions. It analyzes the current status and trends of environmental design education in Italy, the UK, and the USA; in terms of student work capability development, the study deeply explores the cultivation methods in key areas such as occupational adaptability, employability, innovation and entrepreneurship capabilities, practical capabilities, and communication ability. The cultivation of these capabilities is crucial for students' future development; subsequently, it introduces and analyzes the teaching philosophy of simulated companies and its application to environmental design courses. In addition, this study also discusses the theoretical foundations related to teaching model design, including OBE educational theory, cooperative education theory, constructivism theory, and project-based learning theory. These theories provide a solid theoretical support for the teaching model of the environmental design major. Through the analysis of this information, this study aims to deepen the understanding of the research topic, identify

existing problems, and support subsequent research analysis. This study not only helps to improve the teaching quality of the environmental design major but also lays a foundation for the comprehensive development and future career success of students.

1 Research on the Development of the Environmental Design

1.1 Analysis of the Current State of Environmental Design in China

China is currently experiencing an unprecedented transformation. Against the backdrop of the new era, the educational development process of China's environmental design major is a continuous process of evolution and adaptation to social needs. With the rapid development of China's economy and the acceleration of the urbanization process, the environmental design major emerged as an interdisciplinary subject with great market prospects and development potential.

This paper takes the China National Knowledge Infrastructure (CNKI) platform as the basic data source, with the selected data cutoff date from January 1, 2013, to December 31, 2023. The search constraints on the CNKI database were set to "literature," with the theme and key abstract both being environmental art design, obtaining the necessary information for the study and analyzing the development characteristics and laws of the environmental art design major, in order to provide a beneficial supplement to the research on environmental art design. The total number of articles available from the CNKI search is 4,681. From Figure 3-5, it can be seen that since 2013, the number of papers with "environmental design" in the title has increased rapidly, showing a significant growth trend since 2014. "Environmental design has expanded from visual art forms to ecological, psychological, cultural, and informational aspects of the environment. Especially in 2018, it was at its peak because the research scope and application fields of environmental design have expanded, attracting more attention and research interest from various disciplines. In addition, the hot spots of papers with "environmental design" and "environmental art design" as titles are also different: papers titled with "environmental art design" focus more on innovative thinking, aesthetic culture, design thinking, visual arts, and local characteristics; papers with "environmental design" as the key title focus more on knowledge intersection.

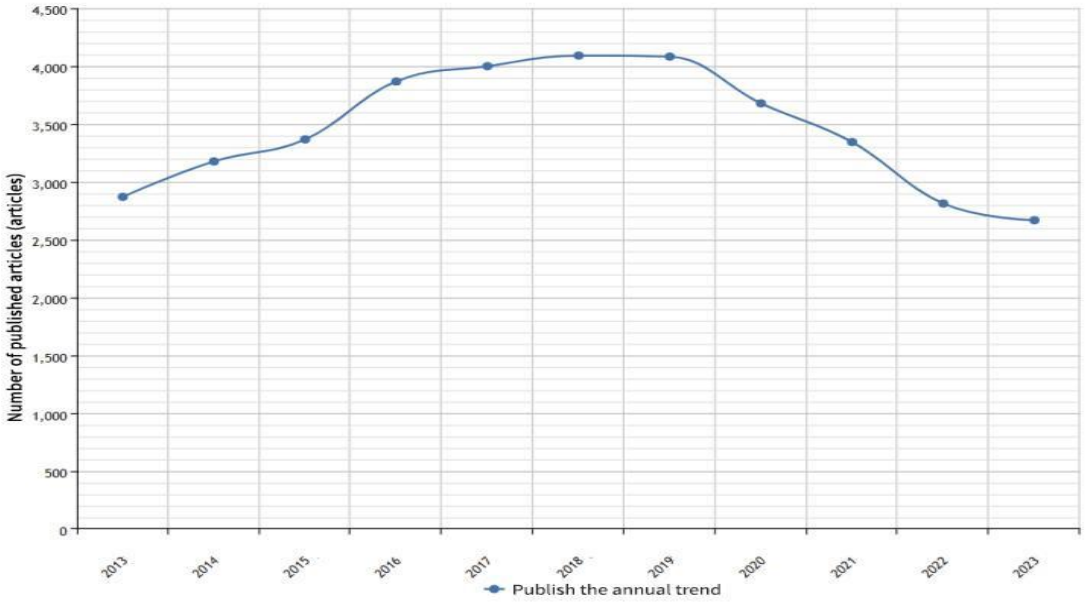

Figure 3 Search CNKI for Annual Trends in "Environmental Design" Publication

Source: China National Knowledge Infrastructure (CNKI)

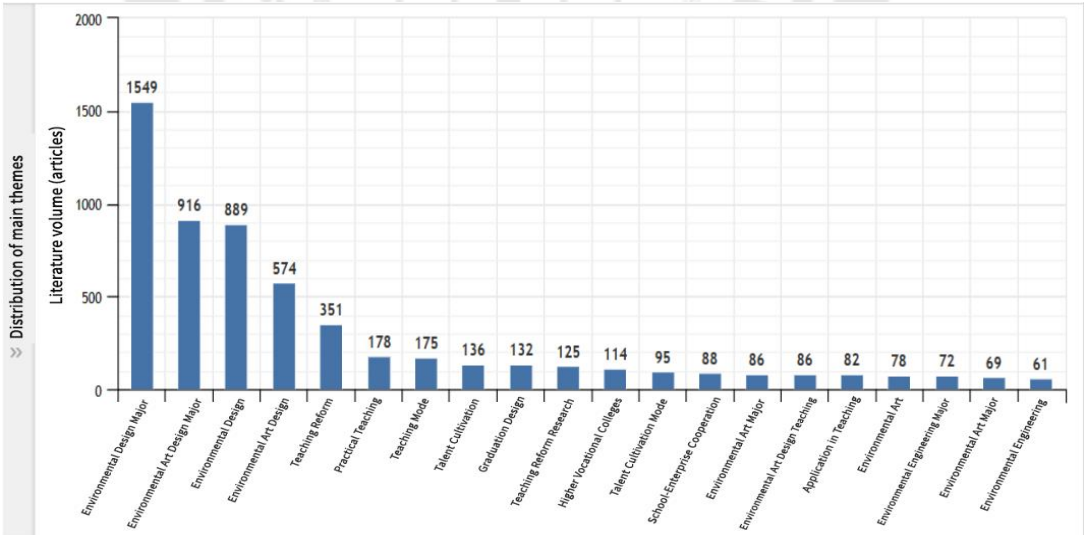

Figure 4 Search in CNKI Distribution of major topics in "Environmental Design"

Source: China National Knowledge Infrastructure (CNKI)

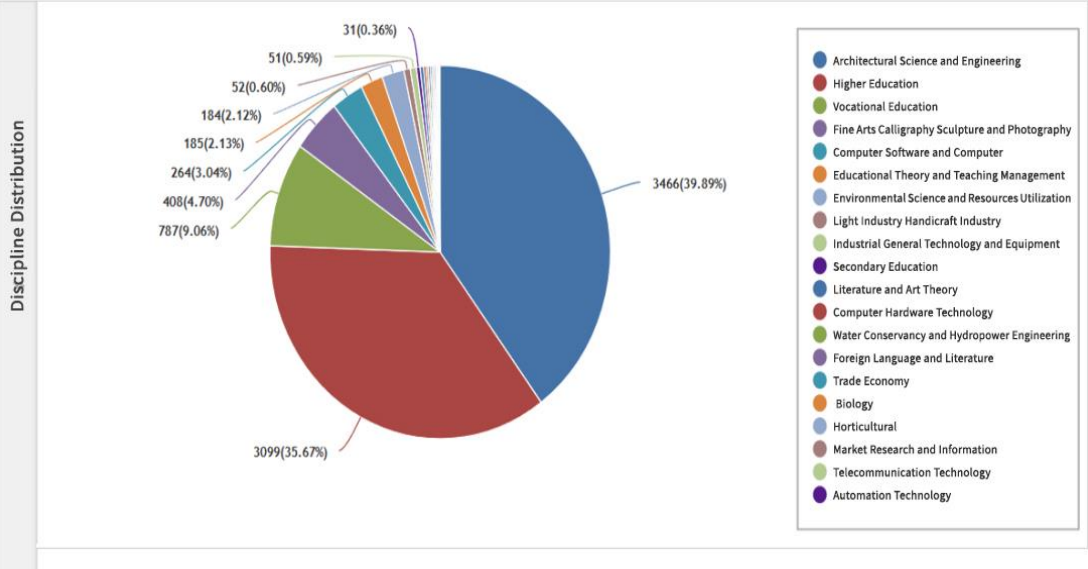

Figure 5 Search in CNKI for "environmental design" discipline distribution

Source: China National Knowledge Infrastructure (CNKI)

Through the study of literature, researchers have summarized the educational development process of China's environmental design major into the following four important stages:

Initial Stage (1950s-1960s): The concept of environmental design originated from interior decoration and architectural design. In the 1950s to 1960s, China's design education was in its early development stage, focusing on functional space design and artistry, emphasizing the improvement of people's living environment aesthetic experience. The earliest can be traced back to 1957 when the Central Academy of Fine Arts and Crafts (now the Academy of Arts & Design, Tsinghua University) established the Interior Decoration Department, which was the earliest interior design major teaching unit in China. At this stage, research on environmental design mainly focused on the functional optimization of living environments but lacked systematic theory and discipline construction.

Development and Evolution (1980s-2000s):Over time, the professional connotation has been enriched, and the social demand for design has grown, leading

the environmental design major to expand from interior decoration to a broader fields such as architectural decoration, interior design, etc. Professor Xi Xiao Peng from the Academy of Arts & Design, Tsinghua University, first proposed the concept of "environmental art" in 1982, and foresaw it developing into indoor, outdoor environments, greening, landscape, and other micro environmental art designs in the future. In 2000, Tongji University renamed the "environmental art design" direction to "environmental design" and began to seek the development of environmental design from a design perspective. Vice President Dr. Yongqi Lou of Tongji University proposed that "our environmental design is committed to creating and facilitating a sustainable 'life-space ecosystem', including the experiences, communications, and places in the interaction process between people and the environment,"(Rapoport, 2013).

Disciplinary Upgrade (2000s-2010s):At the beginning of the 21st century, with design being upgraded to a first-level discipline, the environmental design major has gained further development and recognition. Professional education began to focus on cultivating students' innovative abilities and practical ability. In the "Introduction to First-Level Disciplines for Degree Conferral and Talent Cultivation" compiled by the 6th Discipline Appraisal Group of the State Council of Academic Degrees, it was proposed that environmental design is an applied direction that studies the relationships among natural, artificial, and social environments, aiming to optimize human living and residential environments. Environmental design respects the integrity of the natural environment and cultural landscapes, focusing on both historical and cultural relations and social development needs, characterized by the combination of theoretical research and practical creation, environmental experience and aesthetic guidance. The name of the environmental design major in China has changed several times. In the "Undergraduate Major Catalogue(Lanziyue, 2016) " issued by the Ministry of Education, design was promoted to a first-level discipline, and Environmental Design became a professional application direction of design studies. It belongs to the category of art and design, and is awarded an art degree(Qiman, 2001).

Teaching Reform Under the New Liberal Arts Background (2010s to Present):Under the new liberal arts background, environmental design education has begun to explore interdisciplinary and cross-domain teaching models, emphasizing the combination of theory and practice, as well as integration with the modern design industry. The State Council's 6th Discipline Appraisal Group's "Introduction to First-Level Disciplines for Degree Conferral and Talent Cultivation" stated in 2011: "Environmental design is an applied direction that studies the relationships among natural, artificial, and social environments, with the main purpose of optimizing human living and residential environments. Environmental design respects the integrity of the natural environment and cultural landscapes, focusing on both historical and cultural relations and social development needs, characterized by the combination of theoretical research and practical creation, environmental experience and aesthetic guidance. Environmental design focuses on buildings in the environment, comprehensively applying artistic methods and engineering technologies to implement the design of urban landscapes, scenic gardens, architectural interiors, and other micro environments. Environmental design requires consideration of environmental surveys and assessments, and a comprehensive consideration of ecology and environment, function and cost, form and language, symbolism and signs, materials and structure, facilities and systems, geology and hydrology, greening and vegetation, construction and management, and other factors, emphasizing systematic and integrated design concepts, control and coordination work methods, and the rational formulation and realization of design goals and value concepts." The State Council's "Introduction to First-Level Disciplines for Degree Conferral and Talent Cultivation" changed the major to "Environmental Design" in 2012.(Shuyang, 2012)

The change in the name of the major is not merely a change in Chinese characters; it reflects the different concepts, attitudes of experts and scholars, and expectations for the future development of the major. In the last modification of the name, the academic community did not reach a unified consensus, mainly due to different understandings and uses of "art design" and "design" at the conceptual level,

leading to frequent confusion between the names "environmental art design" and "environmental design" in research and practice, resulting in the phenomenon of "one major, two names." The debate is mainly from two scholars who have made significant contributions to this field(Zhu, 2019). From the reference literature, it can be seen that since 2011, the number of papers with "environmental design" in the title has grown rapidly, showing a significant growth trend since 2013. "Environmental design" has expanded from visual art forms to ecological, psychological, cultural, and informational aspects of the environment. Especially in 2018, it was at its peak because the research scope and application fields of environmental design have expanded, attracting more attention and research interest from various disciplines. Additionally, the hot topics of papers with "environmental design" and "environmental art design" as titles differ: papers titled with "environmental art design" focus more on innovative thinking, aesthetic culture, design thinking, visual arts, and local characteristics; papers with "environmental design" as the key title focus more on knowledge intersection, collaborative innovation, engineering education, innovation capabilities, overall systems, and practical applications.

From Fig 6,The environmental design major itself is a combination of "culture + art + science + technology," and has a high demand for practical ability. Most people believe that the low threshold of interior design and decoration industry is due to the large base of the industry, the general economic conditions of the public, and the consumption level and cultural concepts that have not kept up, and there is still a significant gap in cognition. The demand for smart homes and spatial experience is increasing day by day, yet our design educational concepts are still at the level of form design, and even the basic "function + form + space" "drawings + materials + technology" are not truly coordinated and connected, the products of education are bound to be eliminated by the industry, it's just a matter of time. Tracing the development of the major, environmental art design is the predecessor of environmental design, and the environmental art design major mainly includes two directions: interior design and landscape design. In the environmental design major, what is the

relationship between architectural design, landscape design, and interior design? What is the degree of intersection? It is worth in-depth exploration. The formulation of the talent training program for this major needs to consider the quality of student sources, educational facilities, teacher teams, social demands, and employment prospects comprehensively before formulating specific plans.

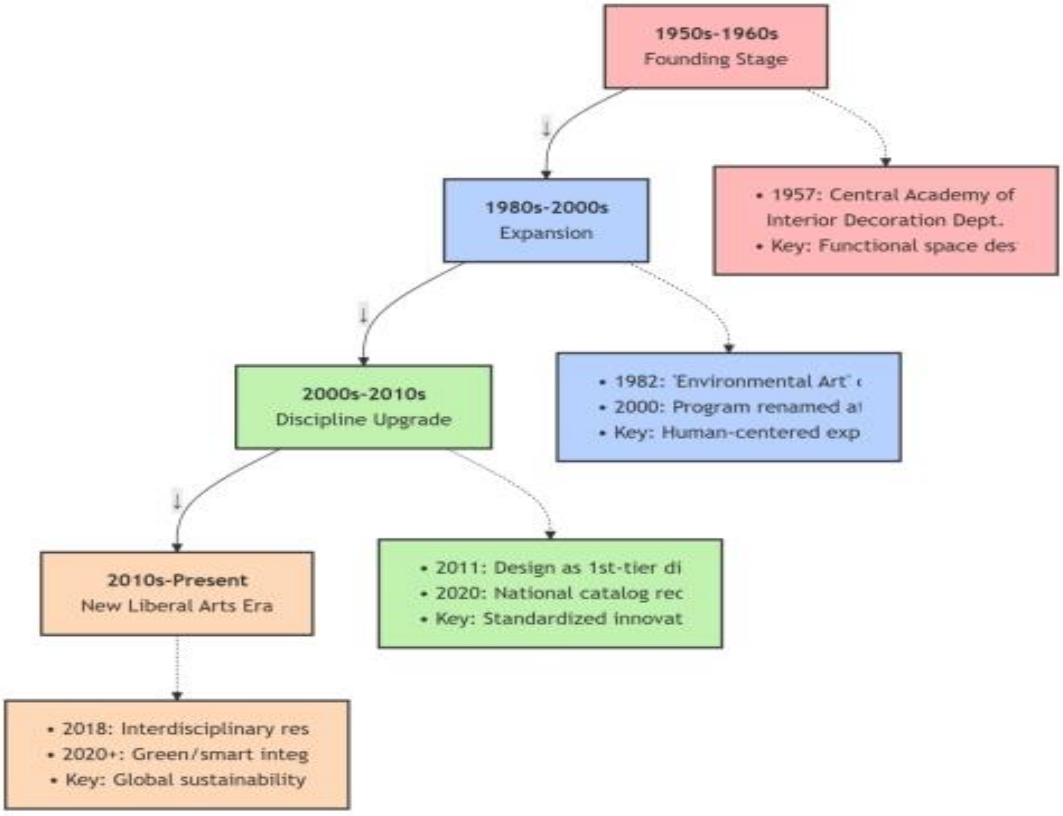

Figure 6 4 Stages of Environmental Design Education in China

Source: Zhao Yajun

Based on the current situation of the environmental design major in China, from the educational perspective: currently, the teaching model of the environmental design major is facing reform. Under the new liberal arts background, the teaching model pays more attention to interdisciplinary and cross-domain teaching, emphasizing the combination of theory and practice, as well as integration with the modern design industry. Universities are exploring cooperation with enterprises, and through efforts in

practice base construction, curriculum optimization, and teacher team building, effectively promoting industry-education integration and improving the quality of education.From Table1,The practical teaching of the environmental design major is valued, and universities, through cooperation.

Table 1 Studies Related to the Development of Discipline Teaching and Learning in Environmental Design Programs in China.

Author	Date of publication	Main points of view
Chen Ling	2014	The teaching content of the environmental art design program is based on market demand and is closely related to social development.
Gan Guiyao	2015	There are still many problems in the teaching of interior design for environmental design majors, such as insufficiently reasonable curriculum, insufficiently flexible teaching methods, and lack of practical teaching.
Zhang Wei,Chen Kouyang	2020	School-enterprise cooperation talent training mode is an important direction of China's education reform and practice and is an inevitable requirement to seek its development and serve the regional economy.
Wei Xuefei	2021	The cultivation of applied talents in environmental design should pay attention to the learning of professional theory and professional ability, and more importantly, should strengthen the reform of professional practice teaching to keep abreast of the times and promote the cultivation of applied talents.
Hu LanZiYue	2016	The imbalance between the training of environmental design professionals and the market demand is becoming more and more obvious, and the curriculum teaching should be changed accordingly.
Cheng Xuesong	2021	Discusses the basic and cutting-edge issues of environmental design major teaching under the background of the new liberal arts, accumulating theoretical and practical resources for the construction of first-class majors in the future.
Wu Qing	2022	Analyzes the current situation of environmental design major education in colleges and universities, exploring effective strategies.
Guo Yaokun	2022	Discusses he deepening of industry-education integration strategies, building a matrix of school-enterprise collaboration, and promoting strategic cooperation between the environmental design major and enterprises.
Wang Xiaokang	2022	Studies the mechanism for training applied undergraduate talents in environmental design major, proposing an innovative training mechanism framework.

Zhang Zhengqi	2024	Discusses the exploration of educational reform in the environmental design major under the background of the "new liberal arts," optimizing the curriculum system, and reshaping training goals.

The researcher has organized the development of China's environmental design major through relevant literature, defining the "environmental design major" discussed in this paper as a design direction that not only meets diverse design needs but also aligns with the concept of sustainable development, ultimately serving society and the economy. The development of China's environmental design major requires consideration of various factors such as talent cultivation, curriculum matching, social demands, and the current state of students. The curriculum should emphasize the integration of theory and practice, covering areas such as green building, environmental psychology, urban planning, etc., while also keeping pace with social needs to ensure that students possess the ability and knowledge required by related industries. The education and industry development of China's environmental design major are currently in a dynamic phase of change, facing both challenges and opportunities. The close integration of educational reform and industry practice will be key to promoting the development of the environmental design major.

1.2 Overview of the discipline development of environmental design majors in foreign countries

Globally, the education mode of environmental design majors emphasizes the combination of theory and practice, aiming at the balanced cultivation of knowledge and ability. However, there is a difference between the definition of environmental design in China and that in Europe and the United States, where environmental design is usually subdivided into independent professional systems such as “interior architecture” and “landscape architecture”. These professions originated in architecture and have developed into independent disciplines over time (Hu Lan and Ziyue, 2016). In this context, the environmental design profession in China can be compared with related professions in foreign countries in order to promote the development of the discipline. Design education in the West emphasizes interdisciplinary cooperation and practical operation to enhance students' comprehensive abilit. Environmental design programs in Europe and the U

nited States have experienced a long period of development, especially driven by the c oncepts of eco-design and sustainable development, and have become increasingly cr oss-fertilized with natural sciences, sociology, psychology, and other fields. The synthesi s of these disciplines has not only promoted the renewal of design concepts, but also le d the trend of global design education. Design schools in Europe and the United States generally emphasize interdisciplinary curriculum and cultivate students' international visi on through field trips, project cooperation and industry practice. This educational model has formed a general consensus in international design education and has had an impa ct on emerging design markets such as China. A study of the discipline development pr ofiles of foreign environmental design programs can not only provide a reference for Chi nese environmental design education, but also help China's design education to better position itself in the global context. The following is a study of the discipline developmen t profile of foreign environmental design programs:

1.21 On the development of Italian environmental design professional teaching

Italy's environmental design education is well known in the world, and its education model emphasizes the combination of practice and theory, as well as the close connection with the industry. By combing through the literature, the researcher summarizes the development status and characteristics of Italian environmental design education as follows: Italian design education focuses on the cultivation of students' practical ability, and almost all schools are equipped with comprehensive practical training courses to make up for the students' deficiencies in terms of ability and experience; taking the Politecnico di Milano as an example, its undergraduate Interior and Spatial Design course aims to cultivate students' mastery of spatial design projects, including the formal, functional and technical aspects of space; in the three-year undergraduate education, workshops on design tools and techniques are conducted in the second year, and comprehensive integration workshops and interdisciplinary workshops, such as materials for interior design, are conducted in the third year; Italy's education system allows different types of institutions (public, private, and

public+private) to offer different majors on their own, which provides diversified educational choices.

Institutes such as Domus Academy work with world-renowned designers and closely integrate teaching with the market, providing students with the opportunity to meet and practice with front-line designers. The Italian education system supports students to choose to become theoretical research scholars or practical designers according to their own wishes, and provides corresponding institutions and course configurations; institutions such as the Marangoni School of Design emphasize cooperation with enterprises, and integrate real design projects into the teaching content, realizing the "projectization" of the curriculum; Italian design education adopts a "graded" approach. Italian design education adopts a "hierarchical" teaching mode, with the problem (design scheme) as the main line, with the field design (project) as the center, with the students (teamwork) as the main body, and with the action (design combat) as the basis, which is a typical case of practice-led teaching. Italian environmental design education is known for its practice-orientation and flexibility.

The education system emphasizes the combination of theoretical knowledge and practical ability, and enhances students' professional ability and practical work experience through comprehensive practical training courses. The Interior and Spatial Design program at Politecnico di Milano is a prime example of a program that not only teaches the basic ability of design, but also provides students with an in-depth understanding of the many facets of design through workshops and interdisciplinary projects. As shown in the researcher was able to more comprehensively geographize the research dynamics and academic trends in the field of environmental design in Italy by systematically combing and deeply analyzing the existing literature.

Table 2 Relevant studies on the pedagogical development of the discipline of environmental design in Italy.

Author	Publication Year	Main points of view

Huang Yanli	2015	Explores the internationalization strategy of Italian design education, including its multi-level degree system and the university credit system based on ECTS.
Cao Tian	2018	Analyzes the "modular" teaching model in the postgraduate education of Marangoni Design School in Italy, discussing its teaching methods and curriculum settings.
Li Sha	2010	Examines the history and development of Italian design education, and how it seeks innovation and breakthroughs while inheriting outstanding cultural traditions.
Zhang Hua	2019	Discusses how Italian art and design education adapts to the needs of modern society and what modernization reforms have been implemented.
Wang Lei	2021	Talks about the practical teaching and innovative methods in Italian design education, and how they affect students' design thinking and career development.
Chen Mo	2020	Reviews the historical development of Italian art education and analyzes its transformation in modern society, especially under the background of technological innovation and globalization.
Zhao Min	2017	Discusses the characteristics of Italian design education from the perspective of cross-cultural communication and how it affects the interaction and learning experience of international students and teachers.
Li Qiang	2022	Focuses on the sustainable design practices in Italian design education, exploring how students apply sustainable design principles and strategies in their projects.

In addition, the flexibility of the Italian education system is reflected in the fact that it allows institutions to set up their own curricula and specializations in order to adapt to the changing needs of the market. Students can choose to become theoretical researchers or professional designers according to their own interests and career plans. Italian design education also focuses on the development of innovative teaching models, such as the “hierarchical” teaching method, which focuses on solving practical design problems and encourages students to participate in projects in a teamwork manner, thus cultivating their practical ability and innovative thinking. This project-based teaching method not only improves students' participation, but also lays a solid foundation for their careers. Through studying design education in Italy, we reflect on the current situation of art and design education in China.

1.22 The development of interior design teaching in the UK

Higher education in the United Kingdom specializes in environmental design, but they are called by different names, such as “interior design, spatial design”. They are known for their diverse and distinctive teaching models. The development of environmental design teaching in the UK is known for its diverse and distinctive teaching models, reflecting its diverse teaching priorities.

The UK is one of the first countries in the world to put forward the concept of “creative industries”, and its creative industries have made a significant contribution to the economy, becoming the second largest pillar industry after the financial sector. The average annual output value of the UK's cultural industry is close to 60 billion dollars, accounting for about 8% of the gross domestic product (GDP), which is more than that of any traditional manufacturing industry. 2017, the output value of the UK's creative industry exceeded 100 billion dollars, and the contribution of the creative industry to the UK's economy is about 14.6%, which is the second largest pillar industry after the financial industr(Weiping, 2017). The UK was the first country to put forward the concept of “creative industries” and the first country in the world to promote the development of creative industries by policy. In the UK, the design industry is considered to be an important factor in the economic success of a country or a company, as well as a gene for social stability and coordination. The government's emphasis gives strong support to the design industry, which in turn promotes the creative cultivation of design talents. Thus, the conditions for the emergence of cultural and creative industries, which are closely related to design education, industrial development and economic conditions, have gradually matured(Kai, 2008). The openness, diversity and innovation of British art and design education, and the cultivation of its creative thinking, to be innovative, requires a free environment, independent learning, full respect and timely affirmation. Recognition of innovation not only comes from students but also from teachers, universities, government and even the whole society. In the face of the domestic creative industry in its infancy and the growing enrollment of art and design students in

colleges and universities, the cultivation of innovative thinking in Chinese art and design education has a long way to go(Changxue, 2020).

The main goal of design education in the UK is not only to cultivate students' learning ability, but also to pay more attention to the exercise of students' practical ability, create conditions to maximize the cultivation of students' dispersive thinking and innovative ideas, i.e., the cultivation of independent thinking and independent work, and the cultivation of personalities, which is used as a simple criterion and a starting point for the school to formulate the system and carry out the teaching activities; the teaching system in the UK is modularized, and a diversified teaching team is composed of a number of teachers. The British system of teaching is modular and consists of a diverse team of teachers. The curriculum in the United Kingdom is designed to turn related courses into a module, that is, several related courses form a small course system for complementary learning. The introduction of " dual-teacher" teachers in the UK requires teachers to have experience and background in design companies, so that they can better integrate the hot topics in practical design into the classroom, and the training of students is also carried out between design studios and college classrooms, which is a teaching mode that can better combine theory and practice, thus promoting the development of art and design colleges towards the goal of "learning and practice". This teaching mode can better combine theory and practice, so as to promote the art and design colleges and universities towards the " learning and use" closely integrated direction of healthy development. British art and design education focuses on a variety of creative ideas, the pre-design perspective encompasses an extremely rich field, from history, astronomy, biological knowledge and even general knowledge of life of all kinds of revelation, are encouraged to apply to the design thinking; British higher art and design education focuses on the students' observation, imagination, and the cultivation of the way of thinking, so that the students master the active acquisition of knowledge, to become a knowledge explorer rather than a passive recipient of knowledge. explorer rather than just a passive receiver(Weiping, 2017). In the teaching of environmental design majors, the UK pays more attention to

guiding students to learn independently. It is student-centered, with teachers guiding students to actively achieve their own goals through multiple perspectives, supplemented by a variety of technical support and multi-dimensional evaluation tools. The advantage of this model is that it can train students' independent learning ability and critical thinking ability, as well as cultivate teamwork and communication ability, and guide interdisciplinary thinking.

Table 3 Relevant research on the development of teaching and learning in the environmental design discipline in the UK.

Author	Publication Year	Main points of view
ChaYan Sen	2021	The innovative education mode of interior design majors in British universities and their characteristics are discussed, as well as the inspiration for Chinese art education.
Men Delai	2011	The innovative training methods of British art and design education are analyzed, and observations and reflections on Chinese education are presented.
Wang Wu	1999	The current situation of design education in the UK is investigated, and reflections are made on the characteristics and teaching methods of UK design education.
Ren Yucao	2012	The inspiration of British art and design education for China, including education mode, teaching methods and talent cultivation strategies, is discussed.
Ding Weijia	2014	The exploration of interdisciplinary teaching practices in the field of higher art and design education in the UK over the past decade is examined.
Tian Mimi; Pan Changxue	2020	Explored how the interior design course at the University of Falmouth in the UK cultivates creative thinking, analyzed the teaching methods and the cultivation of students' creative ability.
Zhan Kai	2008	The impact of the development of cultural and creative industries on art and design education and how art and design education adapts to the needs of cultural and creative industries are explored.
TianYuan; Tian Weiping	2017	By comparing the similarities and differences between higher art and design education in China and the UK, the article explores the differences between the two countries in terms of educational philosophy, curriculum, teaching methods and talent cultivation modes, and puts forward the inspiration for China's art and design education.

As shown in Table 3, through the systematic combing and in-depth analysis of the existing literature, the researcher is able to more comprehensively study the research dynamics and academic trends in the field of art and design in the United

Kingdom. Referring to the “sandwich” courses of some British universities, i.e. the model of school-enterprise school, Chinese higher education should strengthen the connection and cooperation between schools and enterprises, and jointly explore and implement the cultivation program of higher environmental design talents, so as to improve the students' career planning ability as well as execution ability, management ability and team spirit, etc., and make the students directly involved in the process from design to production, so that they can directly participate in the design to production. The Chinese higher education should strengthen the connection and cooperation between schools and enterprises to discuss and implement the cultivation program for higher environmental design talents, improve students' career planning ability, execution ability, management ability and team spirit, etc., so that students can directly participate in all aspects from design to production, so that art and design education is more coherent and practical.

1.3 About the development of the United States interior design professional teaching

Chinese research scholars for foreign interior planning education research, for the United States design education related research is the largest number, the time of its research literature is also the latest. 2020-2023 in China's authoritative core design journal published a number of articles on the study of the United States interior design profession. Among them, Yang Dongjiang, a professor at the Academy of Arts and Design, Tsinghua University, mentioned that the development of the American interior design curriculum system reflects the reforms and adjustments made in the curriculum system settings according to the needs of society and student development under the role of different political, economic and cultural factors. (1) Social demand is an important driving force for the development of interior design higher education in the United States. Build the curriculum system centered on social demand and student development. (2) Focus on the logical relationship between curriculum and training objectives, the United States interior design education is more similar to the domestic. It is mainly distributed in art colleges and comprehensive universities, and the curriculum

has formed a clear correspondence with the training objectives of the discipline. Among them, the interior design majors belonging to the art disciplines pay more attention to the cultivation of artistic cultivation, performance ability and professional knowledge; the interior majors under the architectural discipline system emphasize more on the relationship between architecture and interior, focusing on the study of architectural foundation, spatial form and humanistic qualities. (3) Improvement of curriculum standards by the education system and industry associations.

Most U.S. colleges and universities interior design curriculum standards are in the education system and industry associations jointly promote the adjustment and improvement, and in the process of developing a mature accreditation system has been established, the content of the accreditation has become an important measure of the conditions of the institutions and the quality of schooling embodiment. Accreditation system mainly includes institutional accreditation and professional accreditation at two levels, is a self-assessment and peer assessment-based quality assurance mechanism, but also one of the important means of self-management of U.S. colleges and universities. The implementation of the accreditation system has played a crucial role in promoting the continuous quality improvement and competitiveness of American higher education institutions.

The curriculum of the California College of the Arts in the United States is typical and representative. California College of the Arts interior design program has formed a number of interdisciplinary studios, set up to include the synergy of life science and technology and art and design, computer science and studio practice, interactive dynamic art and other different research areas and themes, students need to be completed in the third and fourth years of the interdisciplinary studio in at least three directions. With this curriculum design, interior majors must work collaboratively across disciplines with students in computer, architecture, interactive, and life sciences. At the same time, they utilize the technical support of the high-tech industry in the Bay Area of California, where the school is located, to solve technical problems encountered in their studies. Ultimately, through collaboration, experimentation, and lecture critiques, they

demonstrate the complexity of advanced technology and how the results of other disciplines can be used to embody an understanding of and critical thinking about the interior design profession. Through cascading design studio projects, students are helped to understand the value of existing environments and apply green and sustainable design concepts to real-world design scenarios(Xiao, 2022).

With the development of the times and the ever-changing needs of society, interior design higher education must support and safeguard future professional development and solve complex interdisciplinary problems through its own continuous advancement. In the United States, the development of environmental art and design is relatively advanced, with more than 70 professional art colleges and more than 580 comprehensive universities having related disciplines. Although there is not much difference in the overall appearance, these schools will set different goals according to their own needs and development; for example, some focus on the social effect of environmental design, emphasizing the solution of environmental problems; some focus on the market effect of design, focusing on the visual expression of style and form. Because the United States is a developed country with business development and economic growth, design education has also developed gradually with social change(Ziyue, 2016). This viewpoint above is in line with the main research starting point of this paper.

Table 4 Relevant research on the development of teaching and learning in the environmental design discipline in the US.

Author	Publication Year	Main points of view
Yang Dongjiang; Qin Xiao	2022	The insights from U.S. higher education for China lie in its curriculum closely aligned with societal needs, interdisciplinary integration, combined practice and theory teaching methods, and industry certification systems. These features emphasize the cultivation of innovation and international competitiveness, providing a developmental path for Chinese education.
Hu Lan Zi Yue	2016	The insights from U.S. environmental design undergraduate education for Chinese education include interdisciplinary integration, emphasis on practical

		teaching, application of technological tools, establishment of professional certification systems, student-centered teaching methods, and the incorporation of sustainable development concepts.
Qin Xiao	2022	U.S. interior design programs focus on the intersection of modern society, ecology, science, and design through a standardized assessment system, emphasizing innovation and interdisciplinary talent cultivation, encouraging students to gain practical experience in independent projects.
Jiang Bin	2011	Analyzing the education at Rhode Island Design Institute and School of the Art Institute of Chicago, the article shows the current state of U.S. interior design education, including its teaching methods, curriculum settings, and innovation capability cultivation, offering insights for Chinese education.
Dong Wei	2000	The overview of U.S. interior design education highlights the importance of comprehensive quality education in cultivating interior design talents. The U.S. education system cultivates design ability, aesthetic abilities, and innovative thinking through diverse courses and practical opportunities.
Dong Wei	1998	Discussing the standards and processes for assessing the quality of U.S. interior design education, including educational accreditation, academic standards, and industry recognition, emphasizes the importance of quality assessment for ensuring educational standards and enhancing students' employability.
Zhang Changjiang	2006	Exploring how U.S. interior design education integrates with professional standards, it emphasizes the education system's focus on practical work ability when cultivating students, and the differences and learning opportunities in educational assessment between China and the U.S.

As shown in Table 4, researchers can gain a comprehensive understanding of the research dynamics and academic trends in the U.S. environmental design field through systematic organization and in-depth analysis of existing literature. As a developed country in business and economy, the U.S. has seen its design education evolve with societal changes, with interior design education continuously adapting to the development of the era and the changing demands of society, cultivating design talents capable of facing future challenges. Compared to the U.S., China's higher environmental design education shares many similarities in methods and approaches. Therefore, we need to draw on U.S. experience, summarize the development experience of its interior design higher education, and refine educational goals and

curriculum systems in line with China's actual conditions to cultivate interior design professionals with a global perspective. The diversity and interdisciplinary nature of U.S. interior design education, along with its closely integrated industry-oriented educational model, provide valuable experience and insights for interior design education.

1.31 Comparison of the development of teaching environmental design majors in China and foreign countries

The researcher mainly through the Italy, the United Kingdom, the United States, China, four countries, a comparative study, as shown in Table 5. Through the various dimensions, analysis of different national conditions to start, all levels of comparison, can be deeper to understand China's existing teaching and curriculum awareness, compare the similarities and differences, and analyze the reasons for this, in order to obtain new ideas and thoughts and summaries.

Table 5 The status quo and comparative analysis of the development of the teaching of foreign environmental design disciplines.

Analysis of the current situation of teaching development of environmental design majors in 4 countries			Analysis of commonalities and differences in the teaching development of environmental design majors in 4 countries	
country	specialized field	Current status of pedagogical development	Commonality	Differences
Italy	Interior Design	Close integration with the market and cooperation with enterprises; requiring familiarity with the regulations of the design industry; comprehensively equipped with integrated practical training courses; conducting integrated workshops and interdisciplinary workshops; encouraging students to participate in projects in a teamwork manner; emphasizing the application of technology; focusing on handicrafts and traditional crafts.	1.Environmental design education in all ountries emphasizes the combination of practice and theory. 2.Interdisciplinary learning is a common trend in design education in all countries. 3. Technical applications, such as	1. Differences in the structure of the education system, cultural influences, industry regulations. 2. Differences in educational accreditation, teacher qualifications and student

United States	Art Design	The government supports and emphasizes the development of the design industry, the needs of society and the development of students; emphasizes interdisciplinarity; and the education system and the industry work together to designate and raise the standards of the curriculum as well as to participate in the training of students. Introducing “dual-teacher” teachers; emphasizing the application of technology; entering a multi-dimensional perspective in the pre-design stage; emphasizing students' active learning; developing communication ability.	CAD and 3D modeling, play an important role in design education in all countries. 4. Cultivation of innovation ability is the focus of education in all countries. 5. Industry cooperation is a common feature of design education in all countries.	competency development. 3. China and Italy emphasize more on the integration of traditional culture and handicrafts. 4. The U.S. and U.K. education systems are more flexible, emphasizing social needs and student development. 5. The U.S. has a mature accreditation system, while the accreditation systems of other countries may not be as mature as that of the U.S.
UK	Interior Design	Social demand is an important driving force; focus on the relationship between curriculum and training objectives; improvement of curriculum standards by the education system and industry; integration of interdisciplinary curricula; emphasis on technology application; joint participation in industry mentoring; combination of education and practice standards.		
China	Environmental Design	Emphasis on integration of traditional culture; emphasis on multidisciplinary intersection; emphasis on practice-oriented; emphasis on sustainable design; emphasis on technology application; is exploring cooperation with enterprises; at present, China's environmental design standards need to be improved urgently.		

An in-depth study of the current state and development of environmental design education around the world has led to a series of research findings. These

studies reveal the current state of teaching and learning in environmental design programs and compare the specifics of different countries in terms of educational commonalities and differences. Although there are differences in policy support among countries, they are mainly reflected in the intensity and manner of support. Countries have different emphases on talent cultivation capabilities based on educational goals and market needs. In addition, the emphasis on cultural exchanges, interdisciplinary integration, and the hierarchy of the teaching system are also reflections of the differences in education between countries. By comparing the development of environmental design teaching in China with that in other countries, we are able to provide guidance for the curriculum and talent cultivation of environmental design programs in China. The study extracted valuable information in multiple dimensions, including policy support, studio construction, corporate cooperation, standardization of academic evaluation, integration of education and industry, dual-teacher training, student collaboration, curriculum project-based development, development of laws and regulations, international laboratory construction, cultivation of innovation and entrepreneurship, emphasis on hands-on ability, emphasis on the spirit of exploration, and promotion of multicultural exchange. These results provide a basis for developing a teaching model with an international perspective for the environmental design program in China(Lou Yongqi, 2008). The significance of the study lies in the fact that it not only clarifies the current status of environmental design education concepts in various countries, but also provides a framework for reflection and analysis of talent cultivation and curricula for environmental design majors in China, which will help promote the development and internationalization of environmental design education in China.

2 Research related to the work ability of environmental design students

With the acceleration of China's urbanization, the rapid development of urban in frastructure construction and real estate industry has posed new challenges to the educ ation of environmental design majors. Urbanization not only promotes economic growth, but also exacerbates the deterioration of environmental problems, which requires enviro nmental design education to adapt to the needs of national development and adjust the

talent training strategy. Chinese college graduates are facing employment difficulties, while the demand for environmental design-related talents is widespread in the market. Therefore, the education of environmental design should focus on cultivating students' practical working ability to meet the needs of corporate positions. The environmental design profession is interdisciplinary in nature, and its teaching results are widely used in the environmental construction industry, which requires students not only to master theoretical knowledge, but also to have the practical ability to apply professional theories to actual projects. Challenges facing environmental design education include the diversified needs of teaching mode, the combination of theory and practice, and the innovation of teaching methods.

Prof. Ding Yuan from the Central Academy of Fine Arts pointed out that traditional teaching is difficult to meet the social demand for diversified talents. Zhang Yuanyuan from Tsinghua University emphasized that environmental design education needs scientific and diversified perspectives, emphasizing multidisciplinary intersection and holistic thinking. Prof. Zheng Xin from South China Agricultural University pointed out that there is a gap between the current training of talents specialized in environmental design and the needs of enterprises, and that the teaching content of some colleges and universities does not match the actual training methods, which leads to the lack of students' innovation and practical ability. In order to adapt to the changes in society and market, the education of environmental design majors should explore a more diversified development direction, including practicality, openness and systemicity. Students need to have an open mind and interdisciplinary ability to adapt to the ever-changing market demand. In the past 20 years, the research trend and hotspots of concern in China's environmental design education concept have focused on industry, market and project-oriented education model, emphasizing the improvement of students' practical ability. In the teaching process, attention should be paid to the roles of teachers, organizers and students, as well as the mode of cultivating the career adaptability, employability, innovation and entrepreneurship, practical ability and communication ability of environmental design students (Yuanyuan, 2020). These abilities are important for cultivating environmental design stud

ents and are the key to improving the quality of education. The five competencies will be analyzed below:

2.1 Career Ability

Effective implementation and development of the career development programmes determine the economic growth of countries. Scholars at home and abroad have various views on the definition of Career Adaptability, but with the deepening of research, some similar or similar concepts gradually emerge. In international academic research on career adaptation, the term Career Adaptability is commonly used, which is initially defined as "a state of readiness to face future predictable tasks in the work role and future changes in the work and work environment" and "the ability to cope well with environmental changes"(Aryee et al., 1996), as well as "the ability to cope well with environmental changes"(Blustein, 1997). Donald E. Super introduced the concept of career anchors, which refer to an individual's core values and preferences in career choices that can help an individual maintain consistency in career decisions. An individual's self-concept (including self-concept, values, interests, etc.) plays a central role in career choice and career development. It is believed that career satisfaction is related to an individual's career development, job role, and the degree of achievement of personal goals. His theories have been widely used in career counseling and career development education to help people better understand their career paths and career choices. His work provided the foundation for later career theorists and had a profound impact on the field of vocational psychology. Later, Savickas further added an explanation to the definition: career resilience is both an attitude, ability, and behavior that enables individuals to match themselves to their jobs, and a psychological resource needed to cope with career transitions, environmental changes, and job development(Savickas, 1997). In addition, there are scholars who define and supplement career resilience from other perspectives, for example, Rottinghaus et al. (2005) emphasize that career resilience is a kind of planning and regulating ability, and individuals with this ability are able to plan and regulate themselves to adapt to career or environmental changes when facing unexpected situations; Guzman and Choi (2013),

from the perspective of psychological Guzman and Choi (2013), from a psychological perspective, regarded career adaptability as a kind of self-directed and managed psychological energy possessed by an individual, which can help the individual to formulate adaptive strategies and take actions in the face of change.

Similarly, the term Career Competency is often mentioned together, which was first proposed by Hackett et al. (1985), and then formally defined by Defillippi and Arthur (1994): Career Competency reflects an individual's ability to develop job ability and knowledge, and the accumulation of interpersonal networks that support career success. ability to develop job ability and knowledge, the degree of awareness of one's career interests, abilities, values, and job choices, and the accumulation of an interpersonal network that supports one's career development and facilitates one's career success.Akkermans et al. (2013) and others also proposed a conceptualization of career competence that includes reflective career competence (reflecting individual strengths and weaknesses, career motivation, career values, and other individual qualities), communicative career competence, and communicative career competence (reflecting individual strengths and weaknesses, career motivation, and career values). Akkermans et al. (2013) and others also proposed a three-dimensional career competency model that includes reflective career competency (reflecting individual strengths and weaknesses, career motivation, career values, and other individual qualities), communicative career competency (the ability to expand professional networks and demonstrate one's occupational knowledge and ability to the external labor market), and behavioral career competency (the ability to explore and explore career opportunities and to plan one's career).

Chinese scholars optimized and integrated the above two concepts and localized the definition of career adaptation when they introduced the concepts into China for career adaptation-related research. Among them, Zhang Chunxing (1992) argued that occupational adaptation has both negative and positive meanings. Negative meaning refers to the situation where the occupation in which an individual is engaged cooperates with his or her interests, abilities, needs, desires and other conditions; if the

occupation in which an individual is engaged cooperates with all or most of the conditions mentioned above, it means that the occupational adaptation is good. Positive meaning refers to the adaptation process in which an individual voluntarily cooperates with the limitations or requirements of his/her occupation, is willing to take the initiative to learn so as to strengthen his/her abilities and cultivate his/her interests, and then overcomes the difficulties to achieve a good situation, to be satisfied with his/her activities in the workplace and finally to realize his/her desires. From the perspective of labor socialization, Hu Shiyong et al. (2003) believe that occupational adaptability should be measured from two aspects: first, whether they can master the knowledge and ability necessary to take on an occupational role; and second, whether they understand the connotations of the work environment, including learning and complying with work systems and norms, and correctly dealing with interpersonal relationships in the workplace. Zeng Weixi (2009) extends the concept of career adaptation from the perspective of psychological traits and proposes the concept of "Career Spirituality", which refers to the positive psychological traits necessary for individuals to adapt to the complexity of the career journey, consisting of "Openness and Flexibility", 'Pursuit of Meaning', 'Pragmatic Action', 'Optimism and Openness', "resilience and persistence". Wang Yifu et al. (2016) defined career adaptation ability as a series of related abilities that individuals need to have to comply with the requirements of the occupational environment and solve the main problems in career development, emphasizing the ability of employees to adapt to the internal and external work environment of the enterprise.

Scholars' research on the occupational adaptation of college students mainly emphasizes the adaptation of college students in the process of transitioning from the campus environment to the work environment, and the factors affecting this process can be summarized as individual factors and external factors.In terms of individual factors, Huo Jianxun et al. (2015) pointed out that the level of emotional intelligence of college students affects their occupational environment, psychological and interpersonal relationship adaptability, and college students with a high level of

emotional intelligence tend to be more likely to deal with the relationship with colleagues and superiors, and are able to adapt to occupational interpersonal relationships better, and at the same time, it is also easier to feel support from the society and the work environment, which is conducive to the occupational adaptability Enhancement. Zhou Chunkai (2003) pointed out that individuals' expectations of their careers, career mindset, as well as their perception of self-worth, interpersonal relationship handling and other factors will have a prominent impact on their career adaptability. Through interviews with a group of college students, Ji Jun (2004) summarized that the individual factors affecting the adaptation to their professional life mainly include the individual's occupational impression, occupational anchor, and the occupational knowledge and ability that the individual possesses, among which the occupational anchor has a more prominent impact on occupational adaptability. Li Fanghong (2015), on the other hand, pointed out that the richer the accumulation of human capital of college students, the more advantageous they can be in interpersonal handling ability, environmental adaptability and vocational ability, i.e., the stronger the vocational adaptability. In terms of external factors, support from organizations, universities and social aspects is an important factor influencing college students' (Johnston, 2018).

On the one hand, the training arranged by the organization for new college graduates can help them understand the corporate culture, familiarize with job knowledge and work ability, and facilitate the initial establishment of interpersonal relationships, thus helping new employees to quickly adapt to the work environment(Rudolph et al., 2017), while the sense of organizational support can directly affect the career adaptability of college graduates as new employees(Rottinghaus et al., 2012), and the superior's support for subordinate new employees' support can also improve their career adaptation(Maggiori et al., 2013). On the other hand, career adaptation education in universities, career planning education (Wang Zhijing et al., 2015), and employment guidance work all have a positive impact on the cultivation of college students' career adaptability. In addition, parental support from the family level, the gradual improvement of the employment market norms, laws and protection system

at the social level, and elements such as the mainstream ideology of society, the demand for vocational development, and the change of career direction also invisibly promote the cultivation of college students' career adaptation ability. adaptation ability cultivation(Chen et al., 2020).The researcher provides the main points of view of different scholars on career adaptability, different research perspectives. as shown in Table 6:

Table 6 Definition of the structure of vocational adaptability by different scholars.

perspectives	Scholars	The Conceptual Structure of Vocational Adaptability
Content perspectives of ability competencies	Super (1997)	A quality of being able to cope better with changes in the environment.
	Blustein et al. (1997)	Career decision-making, self-exploration, understanding the professional environment, seeking solutions from others.
	Savickas(1997)	Self and Environmental Exploration, Career Planning, Career Decision Making, Self-Management.
	Savickas(2002)	Career Decision Making, Career Planning, Career Exploration, Career Confidence.
	Klehe et al.(2011)	Career planning, career exploration.
Psychological resources perspective	Savickas(2005)	Concern for one's future work role (concern); control over one's vocational activities (control); curiosity-based educational and vocational choices (curiosity); confidence to carry out the vocational choices one makes (confidence)
	Sarah et al. (2007)	Boundaryless thinking, proactive personality

The transition of college students from student roles to work roles is a key process of career adaptation, and students majoring in environmental design need to learn how to apply what they have learned in real work environments; the formation and cultivation of career adaptive ability relies on specific situational elements, and the education of environmental design majors should focus on practical and situational teaching in order to enhance the career adaptive ability of students; the simulation company provides a platform close to the actual working environment which helps students to enhance their career adaptability in environmental design; educators should explore new educational modes, such as the simulation company pedagogy, to better

prepare students to face future career challenges. To sum up, the research on the factors affecting college students' career adaptive ability is fragmented, and most of them summarize or verify the static factors affecting career adaptive ability from a static point of view. For college students, career adaptive ability is the process of transforming the role of a student to the role of a working student, and the process of transforming the environment of the campus to the working environment, which emphasizes the adaptive ability of the brand-new roles and the brand-new environments. From this perspective, the formation and cultivation of college students' vocational adaptive ability should depend on certain contextual elements, and should be cultivated in certain kinds of practical learning process. Based on this, this study explores the path process of college students' vocational adaptive ability enhancement in the simulated company situation from the perspective of dynamic process, with a view to constructing a systematic process teaching model(Koen et al., 2012).

2.2 Employability

University graduates occupy an interesting position in the economy and there are still competing interpretations about the outcomes of graduates when they enter the labour market.The concept of Employability is derived from Employment. The employability of university graduates has dominated much educational and economic policy over the past decade. Employability remains a difficult concept to measure and define. The issue has been largely framed by the perspectives of policy makers and employers. Similarly, the issue has tended to be approached in a way which focuses either on supply-side features of the labour market or the structure of labour market demand. However, the discourse into employability continually overlooks the subjective dimension of employability; in particular, how it relates to not only the way individuals come to perceive and understand the labour market they are entering, but also the types of dispositions, attitudes and identities they develop around their future work and employability.The concept “Employability”, introduced by Hillage and Pollard in 1998, usually refers to an individual's ability to obtain and keep a job. The concept emphasizes an individual's competitiveness in the labor market and his or her ability to

adapt to changing work environments. The concept of employability was first proposed by the British economist Beveridge in 1909, who argued that employability refers to an individual's ability to obtain and keep a job(Harvey, 2001). Chinese researcher Mou Biao mentions that college students' employability is the competence that graduates have acquired through the learning of knowledge and the development of comprehensive qualities during their school years, which enables them to realize their employment ideals, satisfy the needs of the society, and realize their own value in the society. In order for college students to have the ability to perform competently in their employment positions, colleges and universities are oriented to the actual needs of the job market and formulate the education mode of talent training programs. Its advantage is that students have stronger practical ability, very popular with employers, and have a higher employment rate. The key of employment-oriented education is to cultivate the employment ability of college students, which is currently recognized by the academic community as an effective.solution to the difficulty of college students' employment(Guilbert et al., 2016). Adaptability is the key to the smooth transition from the student role to the social professional role, which refers to the psychological and physiological adjustment ability to manage oneself in various environments(McQuaid et al., 2005).The researcher provides the main points of view of different scholars on employability, different research perspectives. As shown in Table 7:

Table 7 Definition of the structure of Employability by different scholars.

Research Perspectives	Scholars	Main points of view
Employability Definition	Hillage, J., & Pollard, E. (1998)	The importance of ability, adaptability and learning abilities in an individual's employability was emphasized.

Career Management	Arthur,M. B., & Rousseau, D. M. (1996)	The relationship between employability and individual career development initiatives was discussed.
Personal Identity Construction	Collin, A., & Young, R. A. (2000)	The relationship between employability and an individual's ability to position himself or herself in society and to realize his or her self-worth was analyzed.
Psychological dimensions	Fugate, M., Kinicki, A. J., & Ashforth, B. E. (2004)	The psychological dimensions of employability, including career exploration, career identity and career adaptation, are proposed.
Higher Education and Employability	Coyle, Y., & Watts, A. G. (2012)	The role of higher education in developing students' employability is discussed.

In the field of environmental design, research on employability emphasizes the ability of designers to secure and retain jobs in the workplace, as well as to achieve excellent performance and adapt to changes in their roles. Environmental designers need to understand and respond to societal demands for sustainability and environmentally friendly designs, which requires them to possess relevant knowledge and ability to create aesthetically pleasing and eco-friendly design solutions. As the environmental design industry continues to evolve, designers must possess competitiveness, including innovative thinking, technical application, and project management abilities, to stand out in the job market. Employability also includes designers' ability to use work opportunities to develop their personal careers, achieving professional goals and growth. In summary, research on the concept of employability, the core commonality among foreign scholars' views is the ability to secure and maintain employment, achieve excellent performance in positions, adapt to changes at work, and realize potential through job opportunities(Tymon, 2013). Therefore, the author, in combination with the actual situation of environmental design students, preliminarily considers the core content of employability to be the ability to meet societal needs, secure employment positions, and have sustainable development capabilities.

2.3 Innovation and Entrepreneurship

The concept related to innovation is "innovative ability," which refers to the ability or capabilities required to implement innovative actions. In academic circles, different subjects have different interpretations of college students' sense of responsibility. In sociology, the concept of sense of responsibility is discussed as "When individuals or groups want to contribute to national construction and social maintenance through their own efforts, they show their high quality in the process. The sense of responsibility is not produced in a plain way, it is formed in the social values and a good atmosphere. In other words, it is the correct understanding of the identity given by the society by individuals or groups, and on top of this understanding, it is necessary to take action for it" In modern Chinese dictionaries, innovative ability is described as the mindset and performance of striving for innovation. Sociology explains innovation as the process by which humans, for the sake of development, build upon existing knowledge or achievements to propose new insights or to explore previously uncharted territories, invent new applications, or create things that did not previously exist. Shane proposed in their research that the core of innovation and entrepreneurship lies in identifying and seizing business opportunities, and integrating various resources to realize these opportunities.

They emphasized the importance of innovative thinking, risk-taking, continuous learning, and execution ability, considering these factors as the keys to entrepreneurial success. These perspectives provide a theoretical foundation for understanding the entrepreneurial process and guide entrepreneurship education and practice(Shane et al., 1995). From the essence of entrepreneurship, researchers consider entrepreneurship ability as the capacity to discover or create opportunities, creatively integrate resources, establish business organizations, and achieve business profits(Ahlstrom et al., 2018). Entrepreneurship ability is a psychological condition of the subject, manifesting as a combination of professional ability, environmental adaptability, experience management, decision-making, and adaptability to various abilities. In academia, different scholars have varying understandings of innovative ability.

Comprehensively understanding innovation and innovative ability, some scholars, when discussing "broad-spectrum" innovation and entrepreneurship education, propose that innovation and entrepreneurship are "symbiotic relationships." Adding "entrepreneurship" to "innovation" inherently specifies the application attribute of innovation, pointing to innovation in entrepreneurship, focusing on the application of innovation. Placing "innovation" before "entrepreneurship" comprehensively leads entrepreneurship, encompassing innovative entrepreneurship, opportunity entrepreneurship, and high-growth entrepreneurship, which represents a higher level and standard of entrepreneurship(Phan et al., 2010). In China, "innovation and entrepreneurship" is not merely a simple juxtaposition of terms but an essential integration of innovation and entrepreneurship.

Innovation and entrepreneurship are interrelated; they share the same nature, and successful entrepreneurial cases are inseparable from innovative ideas, while successful innovations often emerge in the process of entrepreneurship (Ding Li, 2021). Based on the above viewpoints, innovation and entrepreneurship are considered prerequisites for each other, with entrepreneurship as the manifestation of innovation, leading to innovations in products, technology, management, and services. The author believes that innovation refers to the use of existing knowledge and experience, through scientific thinking and practical processes, to improve or create new things, including new ideas, methods, elements, paths, and products. Innovative ability refers to the capacity to use existing knowledge and experience to improve or create new things through scientific thinking and practical processes, including new ideas, methods, elements, paths, and products(Feng et al., 2024).Researchers have provided the main viewpoints of different scholars on innovation and entrepreneurship abilities from various research perspectives, as shown in Table 8:

Table 8 Definition of innovation and entrepreneurship by different scholars.

Perspectives	Scholars	Main points of view

nnovation and Entrepreneurship Education	Kuratko, D. F. (2005)	The role of education in fostering innovation and entrepreneurship is emphasized and a model of entrepreneurship education is presented.
Entrepreneurial Process	Shane, S. (2003)	How individuals identify and capitalize on business opportunities and the impact of these processes on entrepreneurial success are explored.
Innovative Competencies	Amabile, T. M. (1983)	Multiple factors affecting innovation capability are presented, including intrinsic motivation and organizational environment.
Entrepreneurial Strategy	Venkataraman, S. (1997)	How entrepreneurial strategies can help firms gain a competitive advantage in the marketplace is analyzed.
Entrepreneurial Competency Model	Hmieleski, K. M., & Baron, R. A. (2008)	A model of entrepreneurial capabilities is presented, including opportunity identification, resource acquisition, and strategic decision making.

In the field of environmental design, innovation is a key driver of industry development. Designers need to apply innovative thinking to continuously explore and experiment with new design concepts, materials, and technologies to meet market and user needs. Innovation and entrepreneurship abilities are crucial for designers in the environmental design field, enabling them to transform innovative ideas into practical projects, such as starting design firms or leading multidisciplinary teams, turning design concepts into specific products and services. These abilities allow designers to create new value and enhance the social, economic, and environmental value of projects through innovative design. Designers with innovation and entrepreneurship capabilities can play a leading role in the industry, promoting the development of design practice and education. These abilities are especially important for students majoring in environmental design, as they relate not only to students' personal career development but also to how they will create value and influence in future design and business fields.

2.4 Practical ability

Academics do not have a unified and authoritative explanation of the definition of the concept of practical competence and what it means.Kolb put forward the concept of practical competence in his theory of experiential learning, which considers practical competence as knowledge and ability acquired through hands-on experience and operational activities. He regarded the learning process as a cycle, including four stages: concrete experience, reflective observation, abstract

conceptualization and active experimentation.Kolb's theory emphasizes the combination of practice and theory, and believes that theoretical knowledge can be better understood and applied through practical operations(Kolb, 2007).Kolb's theory also takes individual differences into account, pointing out that different learners may have different learning styles, but that experiential learning promotes an individual's comprehensive development. He emphasized that practical competence is not only about mastering operational ability, but also about being able to apply learned knowledge and ability to new contexts and realize the application of learning.Kolb's viewpoint regards practical competence as a key element of the learning process, and that through the experiential learning cycle, learners are able to enhance their practical competence by continuously acquiring experiences from practice, reflecting on them, and constructing new knowledge in this way. The enhancement of such competence helps learners to adapt and innovate in an ever-changing environment, laying a solid foundation for their future careers. Robert J. Sternberg, an American psychologist, defines practical ability as an ability to externalize abstract ideas into actual material results and turn theory into practice. Dr. Willy Fu believes that practical ability is a kind of individual's mental quality and physiological characteristics that can skillfully apply existing knowledge and ability to solve practical problems, which mainly includes general, specific and situational practical ability(Derry & Murphy, 1986). Hu Zhongqing et al., on the other hand, believe that the connotation of this concept mainly includes two aspects, namely, business ability and basic ability, and is refined into twelve fine indicators, such as innovation, interpersonal interaction and collaboration. (Zhang Jixiong, 2011)

In a nutshell, practical ability can be regarded as a comprehensive ability, which is the ability of an individual to solve problems by applying the existing knowledge reserves when encountering practical problems. From the pedagogical point of view, practical ability is the ability of students to mobilize their existing knowledge and ability in the learning process and be able to solve problems practically. (Jie Wang, 2012) Practical competence is the practical competence required by a specific profession,

which incorporates the "specialization" of a specific discipline on top of the general meaning of practical competence. Researchers from different disciplines have given different connotations to "professional practice competence" from different disciplinary perspectives. Xiang Xinghua and others believe that practice ability should include general practice ability, professional practice ability, contextual practice ability and practice motivation. Specifically, professional practice ability mainly includes the professional ability and knowledge needed in the professional field. They advocate that the most important practice ability of environmental design students should be the innovation ability based on the application of knowledge, and these four dimensions are complementary and indispensable in the cultivation of practice ability, and professional practice ability is an important part of practice ability (Xiang Xinghua et al., 2016).The researcher provides the main viewpoints of different scholars on practice competence, different research perspectives. As shown in Table 9:

Table 9 Views of different scholars on practice competencies.

Perspectives	Scholars	Main points of view
Experiential Learning Theory	Kolb, D. A. (1984)	An experiential learning cycle is proposed that emphasizes the enhancement of practice competencies through four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.
Career Adaptation	Blustein, D. L. et al. (1997)	The importance of career decision-making, self-exploration, understanding the professional environment, and solution-seeking in practice competencies is explored.
Career Development	Savickas, M. L. (1997)	The role of self- and environment exploration, career planning, career decision making and self-management in enhancing practice competencies was emphasized.
Career Exploration	Klehe, U. C. et al. (2011)	The importance of career planning and career exploration in the development of practice competencies is examined.
Career Confidence	Savickas, M. L. (2002)	The concept of career confidence is presented as an integral part of practice competencies, including career decision making, career planning and career exploration.

Through literature analysis, researchers have found that students majoring in environmental design must master industry-standard design software and

technologies to effectively express and implement design concepts in practice. Interdisciplinary team projects allow students to learn effective communication and collaboration within team settings. Communication ability with clients are crucial for ensuring the success of design projects, and students need to learn how to clearly convey design intentions and understand client needs. In real-world work environments, students must learn to solve problems quickly and creatively. Practical ability is vital for students in environmental design and directly affects their future career success. In environmental design education, students exercise innovative thinking and problem-solving ability through participation in practical projects(McFarlane, 1923). These experiences encompass not only technical application and conceptual design but also teamwork and client communication, which are key ability to ensure that designs meet requirements. The cultivation of practical abilities helps students adapt to the work environment, enhance design quality, and contribute to sustainable societal development. These practical experiences enable students to better understand the complexity of environmental design, laying a solid foundation for their career development.

2.5 Communication ability

Communication is a process, which includes such elements as communication, interaction and perception. Communication is the most important determinant of the entire personality development system. A person perceives another person's "inner world" in the communication process. However, this process requires a particular "inner world" of each participant. Thus, communication is a specific information exchange, the process of sending emotional and intellectual information to the recipient. The person, whose purpose is to have some influence on the recipient, sends a certain message Marx stated, "Man is the sum of all social relations." "The development of a person depends on the development of all other people with whom he directly or indirectly interacts." Therefore, communication ability is a necessary ability for a person's survival and development, as well as a necessary condition to determine a person's success. Communication ability refers to the excellent subjective conditions

possessed by the communicator to be able to communicate competently. In short, interpersonal communication ability refers to a person's ability to effectively communicate information with others, including external ability and internal motivation. Among them, appropriateness and communication effectiveness are the basic yardsticks for people to judge communication competence. Appropriateness refers to the communication behavior that meets the standards or expectations of the communication situation and mutual interrelationships; communication effectiveness refers to the communication activity that functionally achieves the desired goal or meets the needs of the communicator. Communication ability refers to the excellent subjective conditions that the communicator possesses to be able to perform the communication work. In short, interpersonal communication competence refers to a person's ability to communicate information effectively with others, including both extrinsic ability and intrinsic motivation. Among them, appropriateness and communication effectiveness are the basic yardsticks for people to judge communication competence.

Communication ability plays a crucial role in the field of environmental design, which is not only related to the personal career development of designers, but also directly affects the success or failure of design projects. Environmental designers need to communicate frequently with clients, coworkers, vendors, and community members. Effective communication can help designers understand clients' needs, convey design concepts, coordinate teamwork, solve project problems, and maintain good interpersonal relationships in a stressful work environment(Penley et al., 1991).The researcher provides the main points of view of different scholars on communication ability, from different research perspectives. As shown in Table 10:

Table 10 Different scholars' views on communication ability.

Research Perspectives	Scholars	Main points of view
The Role of Communication ability in Career	Spitzberg, B. H. (1994)	A three-dimensional model of communication competence, including cognitive, affective and behavioral competence, was proposed, emphasizing the multidimensional nature of communication competence.

Success		
Communication ability and Emotional Intelligence	Goleman, D. (1995)	Considering communication competence as an important part of emotional intelligence, the importance of empathy and social ability was emphasized.
Communication ability and Career Development	Robbins, S. P. (1998)	Considered communication competence as one of the key factors for personal success, including verbal, written and nonverbal communication.
Communication ability in Online Communication	Witt, P. L. S. (2001)	Communication competence in online communication was examined, exploring specific ability and strategies for communicating in online environments.
Communication ability and Personal Development	Heppner, P. P. (2003)	The role of communication ability in resolving conflict and promoting teamwork is emphasized, and the relationship between communication ability and personal adaptability is presented.
Practical Introductory Teaching Model	Liu, Yuxiao (2014)	The "real-world introduction" teaching mode improves students' communication ability by simulating real work environments, combining theory and practice, and enhancing the ability to solve design problems.
Design communication course teaching mode	Chen, Y. (2017)	Taking living space design as an example, it explores the importance of communication in the design process and emphasizes the cultivation of communication ability of listening, expression, coordination and conflict resolution.
Talent cultivation under the demand of job ability	Ban Naiming; Zhang Xin (2017)	Talent cultivation mode based on job requirements emphasizes the key role of communication ability in the environmental design profession and meets the needs of the industry.

During the design process, communication ability are crucial for designers as they facilitate understanding and collaboration among team members and help designers identify potential issues early in projects to prevent misunderstandings and conflicts later on. Moreover, good communication ability can strengthen the trust between designers and clients, laying a foundation for long-term cooperation. As the environmental design industry continues to evolve, designers face increasingly diverse challenges and need excellent communication ability to adapt to changing market demands. Enhancing communication ability helps designers stand out in fierce industry

competition and gain more opportunities. Environmental design education should place emphasis on cultivating communication ability, allowing students to exercise and improve these ability through simulated projects, case studies, and teamwork. Educators should also encourage students to participate in public speaking, seminars, and other activities to enhance their communication ability and self-confidence. Communication ability are one of the key factors for the success of environmental designers, affecting work efficiency, project outcomes, and personal growth and career development.In summary, by analyzing the current state and challenges of environmental design education, the importance of enhancing students' occupational adaptability, employability, innovation and entrepreneurship abilities, practical ability, and communication ability has been clarified. These five abilities are interrelated and together form the key factors for students' career success. In the rapidly changing field of environmental design, these abilities not only help students adapt to workplace demands but also play a significant role in promoting innovation and development in the design industry.

3 Relevant Research on Simulated Company Teaching Model

In order to effectively enhance students' work ability, researchers have propose d the use of simulated company teaching model. The simulated company model allows students to learn and apply theoretical knowledge in practice by simulating a real workin g environment, thus enhancing their vocational ability and innovative thinking. The mod el emphasizes interdisciplinary learning and teamwork, enabling students to practice the ir communication and collaboration ability in diverse projects while developing their abili ty to solve real-world problems(Bing, 2023).

3.1 The origin and development of the simulated company teaching model

A technology that can simulate students presents an opportunity for education. eachers can develop and practice their craft on simulated students. Students can work collaboratively with a simulated peer or by teaching a simulated student who is less

knowledgeable than themselves. Instructional designers can pilot test their products on simulated students in order to get precise feedback early in the design process. The simulated company pedagogy originated in Germany in the 1950s, initially to address the demand for trade and commerce personnel in the post-war economic recovery and the transfer of unemployed workers in the shipbuilding industry. Simulated companies perform functions in a conscious and professional manner by simulating real market situations and allowing trainees to conduct business activities on their own in a virtual marketplace, experiencing the consequences of decisions and actions. This approach is not only a skill development tool but also a problem-solving based learning technique. As a result, "simulation companies" have emerged, based on schools, social institutions, private organizations, etc(Buba et al., 2020).

Simulation companies simulate real market situations, where trainees conduct their own business activities in a virtual marketplace, and where the outcome of the simulation is not determined by chance or luck, but where participants experience the consequences of their decisions and actions, so that functions are performed in a conscious and professional manner. execution in a conscious and professional way(Avramenko, 2012). Business simulation programs (also referred to as games, exercises, or software) have in recent years become key tools in the educational process of graduate and undergraduate studies in many schools and colleges of business in the United States and elsewhere around the globe. For example, a simulation called "Glo-Bus: Developing a Winning Strategy" was reported to have been utilized in business strategy courses in spring 2012 by 31,000 students in 20 countries. Gimenez (2003) defines business simulation as " a strategically structured and sequential decision-making process around an operational model of a given business, in which participants take on the role of key managers of the simulated company".

Depending on the orientation of the simulation clients and service offerings, students can engage in simulation activities that simulate business processes such as the full range of processes related to the simulation profession(Gimenez, 2016). Thus, This type of teaching activity aimsto develop and consolidate professional skills and

capabilities among students in Economics. Also, the project should be seen as a link between academic and company environment. We are presenting some of our results within a day of reflection organized by a group of researchers whose work is to obtain, on the one hand, the collaboration between several universities and on the other hand, between academic environment and labour market. Starting from our experiences, weintend to reflect together on the implementation of various projects in which students from several universities are interacting and training for active life.

The application of simulation company teaching method is a new measure of traditional teaching reform, which has changed the traditional teaching mode, embodied the ability-based education and teaching ideas, focusing on the direct acquisition of experience and the cultivation of practical ability, and realizing the effect of learning by using and the unity of knowledge and action in teaching. Internationally, many countries are actively building simulated company platforms, such as Denmark and Brazil, to provide training through simulated company programs to cultivate leadership and entrepreneurial behavior. By 1993, Germany had established 930 simulated companies, and by 1998, about 2,775 simulated companies had been established in more than 30 countries on four continents around the world. When foreign scholars discuss simulation companies, they first point out that the conditions for their good operation, in addition to the physical structure of the system and facilities, must be complemented by the appropriate simulation technology and knowledge means. As shown in Figs. 7-9, the advanced search on China Knowledge Network with the theme of “simulation company” retrieved a total of 1,515 articles, and the total number of articles from 2014 to 2024 is 549. According to the metrological visualization analysis of CNKI, the trend of the number of articles is decreasing year by year, and the research themes are mainly distributed in the following areas simulation companies and simulation company pedagogy. The disciplinary distribution carried out is mainly on vocational education and higher.

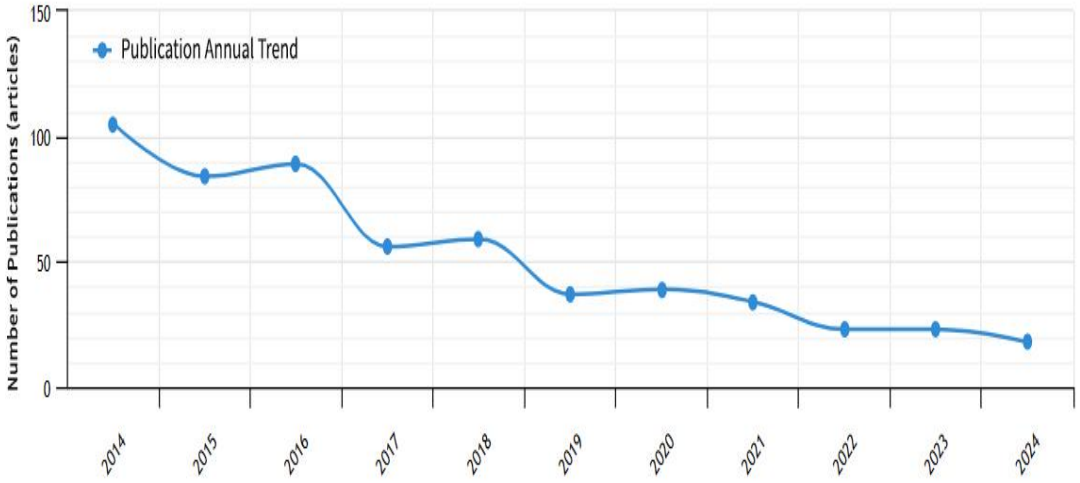

Figure 7 Search for yearly trends in publications with the keyword “simulation company.”

Source: China National Knowledge Infrastructure (CNKI)

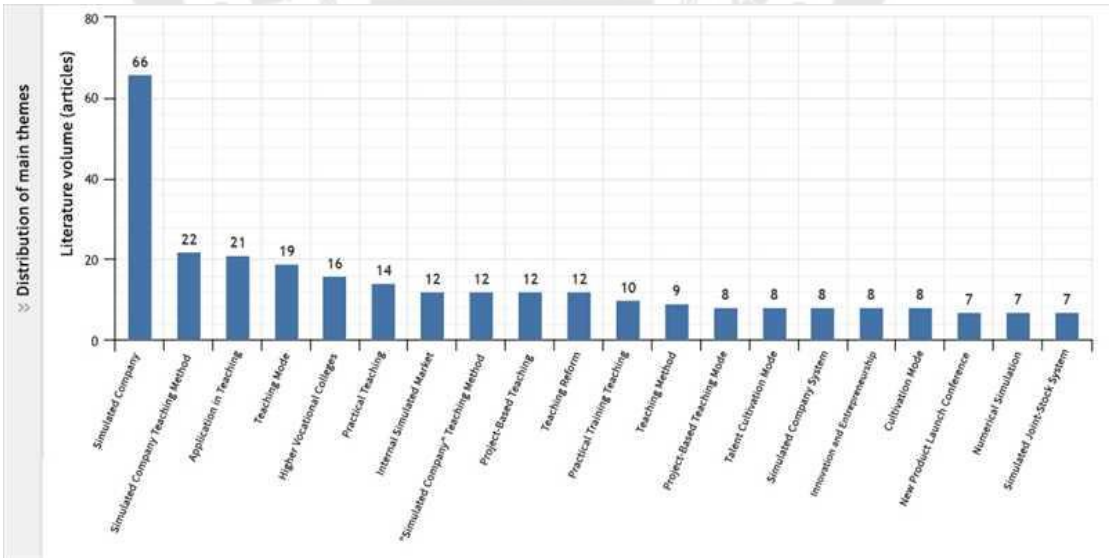

Figure 8 Distribution of searches on the topic of “simulation company”

Source: China National Knowledge Infrastructure (CNKI)

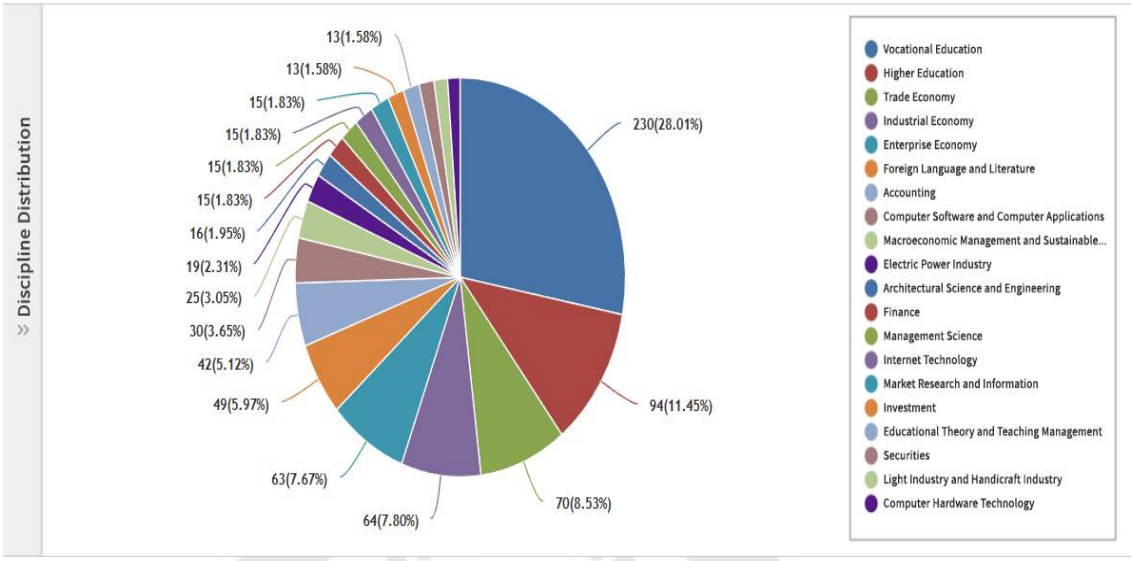

Figure 9 Distribution of disciplines searching for "simulation company"

Source: China National Knowledge Infrastructure (CNKI)

Researchers have followed the needs of China's economic development and talent cultivation, and the model of talent cultivation in the form of simulated companies has been developed from China. China's current research is more such as secretarial majors, finance and commerce majors, international trade majors and other types of professional teaching. China's various disciplines are also actively exploring the localization of the simulation company as a talent training mode, in order to make up for the inadequacy of classroom professional teaching, and cultivate students' practical comprehensive ability. In this paper, we will develop the teaching model of simulation company for environmental design majors, which is in line with the national demand and the development of the discipline and industry. The development of this research may improve the students' working ability, which has a high practical value.

3.2 Practical Research on Teaching Model of Simulated Company

Instructors can determine the level of sophistication of the simulation assigned to their students by increasing or decreasing the scope of managerial tasks to be performed. The more the functions of the virtual company are, the greater will be the degree of sophistication of the game(Dorel et al., 2012). As a practical teaching model,

simulation company has been widely used in the field of education both at home and abroad, especially in the development of vocational ability shows significant advantages. Foreign scholars such as Jorge Albertodos Santos emphasized the physical structure and technical support required for the operation of simulated companies.Scott and Jing Luo discussed the role of experiential learning in the development of leadership. Kenneth and Dallas discuss the importance of organizational simulation in the development of managerial competence, while Richard and Martin confirm the immersive and engaging nature of the simulation learning approach through experimental studies.

When foreign scholars discuss the simulation company, they first point out that the conditions for its good operation, in addition to having a physical structure with perfect system facilities, must be complemented by corresponding simulation technology and knowledge means(dos Santos Junior, 2012). In terms of its role in the development and shaping of students' vocational competencies, Jose et al (2005) point out that the strengths of simulated company technology are that it significantly helps and contributes to the development of thinking, individual initiative, interpersonal and independence ability of the participating students.Scott and JingLuo (2012) discuss the GreenwichBusiness School the effective role of using an experiential learning approach to enable students to develop leadership ability in a proactive, self-directed approach to management practice(Schumann et al., 2006).Kenneth and Dallas (1992), on the other hand, discuss the important role of organizational simulation in the development of managerial competencies, pointing out that OrgSim works well with private and public sector groups, student groups, and crosscultural organizations to form a good OrgSim works well with private and public sector groups, student groups, and cross-cultural organizations to create so-called “live cases” for participants, and participants regularly report strong correlations between their learning in OrgSim and the development of their self-awareness and interpersonal ability, making such simulations valuable in training managers and future leaders(Cannon & Schwaiger, 2003). Martin (2010) explored the

differences between simulated case studies and traditional classroom learning through an experimental study of 57 undergraduate students at a UK university.

The results of the study indicated that simulations of real business environments were more immersive and engaging than text-based case studies, and that students felt "real" about the simulated environment, which facilitated deeper and more in-depth learning. Students feel "real" in the simulated environment, which is conducive to deep and double-loop learning(Martin & McEvoy, 2003). In China, scholars have paid attention to the application of simulation companies in education and teaching, such as Yi Chongying, who emphasized the role of simulation companies in the cultivation of innovation ability of advertising students. Zhao Minggang evaluates the practice teaching mode of American colleges and universities, Huang Er discusses the role of simulation company mode teaching system in art and design majors, and Tian Yingcui et al. put forward the implementation plan of the "simulation company" teaching method, emphasizing its effectiveness in improving students' professionalism and practical ability. The simulated company model provides a practical learning platform for students by simulating the real working environment, enabling them to experience the complete business operation process in simulated business activities, so as to master the theoretical knowledge and business ability required for vocational positions.

This teaching method not only improves students' practical ability and innovation ability, but also enhances the professional quality of teachers and promotes the overall improvement of teaching quality. Although the application of simulation companies in the field of education has received widespread attention, further research is needed on the specific mechanisms of their impact on students' ability enhancement and career growth. Future research should focus on the path of students' ability enhancement in the simulation company environment and explore its impact on students' long-term career growth, in order to fully utilize the role and value of simulation companies in talent cultivation.The researcher provides the main viewpoints of different scholars on the researcher provides the main viewpoints of different scholars on communication competence, different research perspectives. As shown in Table 11:

Table 11 Different scholars' views on communication ability.

Perspectives	Scholars	Main points of view
The use of simulation companiesin advertising education	Chongying (2010)	Through simulated company practice, advertising students are able to gain experience in combining theory and practice.
Practice Teaching Mode in American Colleges and Universities	Zhao Minggang (2011)	A variety of practice teaching models in American colleges and universities are analyzed, including internships and case center teaching.
The role of simulation companymodel teaching system in the art and design program	Huang, Er (2009)	It discusses how the simulation company model can improve students' teamwork ability and innovation ability.
Theimplementation program of teaching method of simulation company	Tian, Yingcui et al (2011)	The specific implementation plan of the simulated company teaching method is proposed, emphasizing the cultivation of professionalism and practical ability.
The role of simulation company technology in the development of management ability	Kenneth and Dallas (1992)	The importance of OrgSim in enhancing the competencies of managers and future leaders is discussed.
The role of experiential learning in leadership development	Scott and Jing Luo (2012)	How Greenwich Business School develops student leadership through experiential learning is explored.
Differences between simulation case study approach and traditional classroom learning approach	Richard and Martin (2010)	An experimental study compares the effectiveness of a simulated case study approach to traditional classroom learning.
The application of simulation companies in advertising education	Yi, Chongying (2010)	By practicing in a simulated company, advertising students are able to gain experience in combining theory and practice.

In summary, simulation company, as a talent cultivation mode under the guidance of theoretical ideas and based on the needs of practice, has been paid attention to in practice and academia, but there is less research on simulation company in the current environmental design professional academia. The simulation company

model provides a new perspective for environmental design education research, emphasizing the exploration and research on the path of students' ability improvement. Through in-depth research on the practice of simulation company, we can find its great potential in the teaching of environmental design majors.

The simulated company model not only provides a simulated workplace environment that allows students to apply theoretical knowledge in practice, but also promotes the overall enhancement of students' professional abilities. The implementation of this model, combined with the specific needs of the environmental design profession, allows for the development of new teaching models that will help to improve students' academic work abilities. Simulation company as a teaching model, its biggest difference with other models such as clubs and internships is that it can provide students with a simulated workplace environment in which students can play real workplace roles for a long period of time and continuously; in the unique artificially-created environment of the simulation company, how do students achieve the enhancement of their vocational ability, what are the conditioning factors and catalysts that influence and catalyze them, as well as how do they influence their long-term vocational In the unique environment of the simulation company, how students realize their professional ability improvement, what condition factors influence and catalyze them, and how it affects their long-term career growth and career, etc., are worthy of further exploration and research, and the black box of students' ability improvement and professional growth in the environment of the simulation company should be opened, so as to better utilize the role and value of the simulation company in the training of talents. The simulation company model has had a profound impact on the teaching model of environmental design majors, which not only improves students' practical ability and career adaptability, but also provides new ideas and methods for educational research and teaching practice. The following research can further explore the application of the simulated company model in environmental design education and how this model can be optimized to better develop students' professional competence.

4 Theoretical basis for the development of an instructional model

The existing research theories provide a solid theoretical foundation for this the sis. Constructivism, Situated Cognition Theory and Shared Regulation Theory are the gui ding theories for the research, and the theories are not separated from each other, but it is important to clarify the meaning of the theories and their roles in the research.

4.1 Research on OBE Teaching Philosophy

OBE is the abbreviation of Outcome Based Education, OBEcan date back to the 1980s, as a tool to facilitate educational renewal, “basing what we do instructionally on the outcomes we want to achieve” It has been promoted internationally in such countries as the United States, Australia, China andSouth Africa. In response to the changes and challenges of the current higher education, neweducational concepts and methodologies should be adopted to ensure the quality of education. which is short for Outcome Oriented Education, Effectiveness Oriented Education, Goal Oriented Education, Demand Oriented Education or Competence Oriented Education, etc. The concept of OBE was firstly put forward by the American scholar, Spandy W.D., who defined it in his book Output-Based Educational Models: Controversies and Answers: Outcome Oriented Education is the concept of Outcome Oriented Education, which refers to the process of teaching and learning that is based on the concept of Outcome Oriented Education. OBE refers to the rational aggregation and organization of resources in the education system after clearly defining the training objectives, and the systematic organization and implementation of the teaching and learning process to ensure that students carry out their learning activities around the training objectives, so as to enable them to gain substantial and successful experiences in their future lives.8 OBE is an educational concept that is oriented to the desired outcome objectives, and is used to reconstruct, implement, and evaluate the content of the teaching and learning process(Jianhua, 2019).

OBE is an educational philosophy of reconstructing, implementing, and evaluating content in terms of desired outcomes, which suggests that teachers need to identify what is important to students before organizing, implementing, and evaluating instruction and to ensure that this learning is ultimately achieved, i.e., reverse designing

the instructional process in terms of learning outcomes.Spandy also argues that reverse designing in terms of outcomes is a student-centered approach to achieving a particular business enterprise by emphasizing the development and training of competencies and skills, while taking into account that every student learns. Spandy also believes that outcome-oriented reverse design is based on the premise that every student can learn by emphasizing the cultivation and training of competencies to meet the comprehensive competency requirements of a certain enterprise or industry(Badkar & Mudgal, 2017). The OBE philosophy emphasizes that all educational processes should be centered on the student's desired outcomes, not on what the teacher provides for the student through classroom instruction, but on what the student is able to achieve, and that the core of the OBE philosophy is a new type of educational philosophy that takes learning outcomes as its starting point, and that is reverse-designed for front-end implementation, student-centered, and continuously improved(Massanari, 2012).

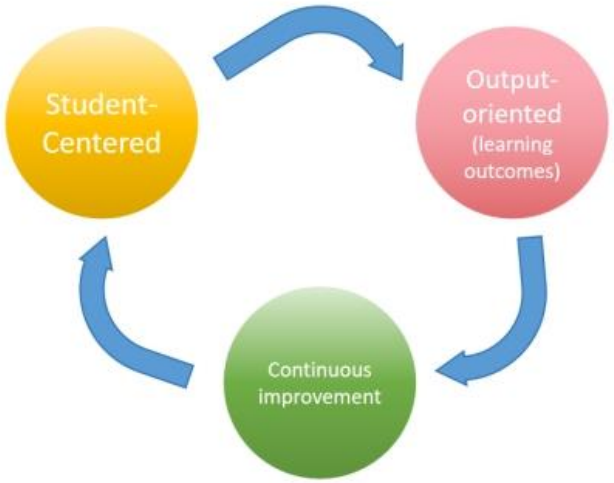

Figure 10 The 3 Core Elements of the OBE Educational Philosoph.

Source: Zhao Yajun

The fundamental difference between the OBE concept and the traditional teaching idea is that: in traditional teaching, the teaching content exists before the teaching objectives and occupies the core position; while in OBE education, the

teaching objectives (students' expected learning outputs) exist before the teaching content and dominate the position, and the development of curriculum resources, the setting of teaching links, and the organization of teaching and implementation of the activities need to be centered on the expected goals.The OBE concept is different from the traditional education. OBE education concept is different from traditional education, in the process of teaching design and implementation, from the needs of enterprises, schools and students, the expected "learning output" oriented to formulate the curriculum training objectives and curriculum system, so as to cultivate skilled personnel matching the needs of enterprises.OBE concept emphasizes that students are the main body of the curriculum, and the curriculum objectives need to be precise. The OBE concept emphasizes student-oriented, precise curriculum objectives and emphasis on the output of the teaching process, which is a dynamic closed-loop system with the cycle of "student-centered--output-oriented--continuous improvement" to promote the effective enhancement of students' own vocational ability and to train students to adapt to the needs of enterprises. It is a dynamic closed-loop system based on the cycle of " student-centered - output-oriented - continuous improvement", which promotes the effective enhancement of students' own vocational ability and plays an important role in cultivating students to adapt to the needs of enterprises' jobs.

The researcher found that the preliminary research on OBE concept at home and abroad mainly focuses on the elaboration of concepts and contents, and then the exploration gradually penetrates into the practice research. In the practical research, Banta (2007) applied it to general education and professional learning to find a way to assess learning effectiveness and achieved remarkable results.Battistini (2009) practiced OBE theory in language arts classroom, and pointed out that in terms of the process of practicing and the results of time, the one who plays the most important role in the learning results is the teacher(Battistini, 1995). role is the teacher. Ikenberry (2010) thoroughly researched and analyzed the methods of assessing learning outcomes identified in outcome-oriented education and outlined the main procedures for assessing students' learning outcomes, which made the evaluation system of the OBE

concept more mature(Ikenberry, 2018).Kennedy (2011) studied the impacts of policies, theories, and practices on the implementation of the OBE theory, and he believed that these three aspects interacted with each other. Kennedy (2011) studied the impact of policy and practice on the implementation of OBE theory in Hong Kong, China, and concluded that these three factors interact with each other to promote the development of OBE, which contributes greatly to the attention of the OBE theory in China.Heena (2018) produced a model of the graduate examination for the mechanical engineering program of a university under the guidance of the concept of OBE, which mainly includes: skillful questioning, effective interaction, and teamwork, which is conducive to evaluating the candidate's critical thinking(Judge et al., 1988). Engineering and medical professions are all highly practical disciplines, and the OBE concept is applicable to the type of teaching in this field, and many scholars have subsequently conducted research in this field.

An advanced search was conducted on China Knowledge Network with the theme of "OBE, Outcome-Based Education" as shown in the figure. A total of 994 articles were retrieved. According to the analysis of the frequency and centrality of the keywords in the previous section, the hot words in the reform of OBE teaching include teaching mode, instructional design, and so on. In the previous period, there was less research on the OBE concept in China, until 2013, when China became a preparatory member of the Washington Agreement, an international agreement on mutual recognition of undergraduate engineering degrees, the number of articles issued showed a trend of increasing year by year.In 2016, after China became a full member of the Washington Agreement, the research on outcome-oriented education showed a trend of substantial incremental increase.The challenge and development of the OBE concept lies in the fact that the development of China's cooperative There are still many difficulties in the development of cooperative education, which are mainly reflected in the fact that the government has not yet issued special cooperative education laws and regulations, and cooperative education lacks protection at the policy level; cooperative education lacks a perfect management system and a scientific evaluation system;

cooperative education's operation mechanism, cooperation methods and base construction still need to be further explored; the community has different perceptions of the concept of cooperative education; cooperative education is currently confined only to the pilot practice, and the scope of promotion is small; the concept of OBE within schools is not well understood. The scope of cooperative education is relatively small; the credit system, academic system and curriculum within schools are not yet able to meet the needs of cooperative education; and the positioning and responsibilities of the various parties involved in cooperative education are not clear enough.

China must face up to the problems in the development of cooperative education and promote the continuous improvement of cooperative education in the process of deepening reform. With the proposal and implementation of collaborative innovation among industries, universities and research institutes in China, the future development of cooperative education in China will show an increase in the number of participants, an extension of the scientific domain, a global expansion and an enlargement of the educational group, and ultimately realize the "comprehensive education for all, full education for all and full education for all" of cooperative education. Through the study of cooperative education, the researcher summarizes the advantages and disadvantages of various parties, and puts forward suggestions and strategies to optimize and construct the operation mechanism of cooperative education in China, which theoretically explains the feasibility and reasonableness of the smooth implementation of cooperative education in China(Fandi, 2021). The researcher provides the main viewpoints of different scholars on practicing competence, different research perspectives. As shown in Figure 12:

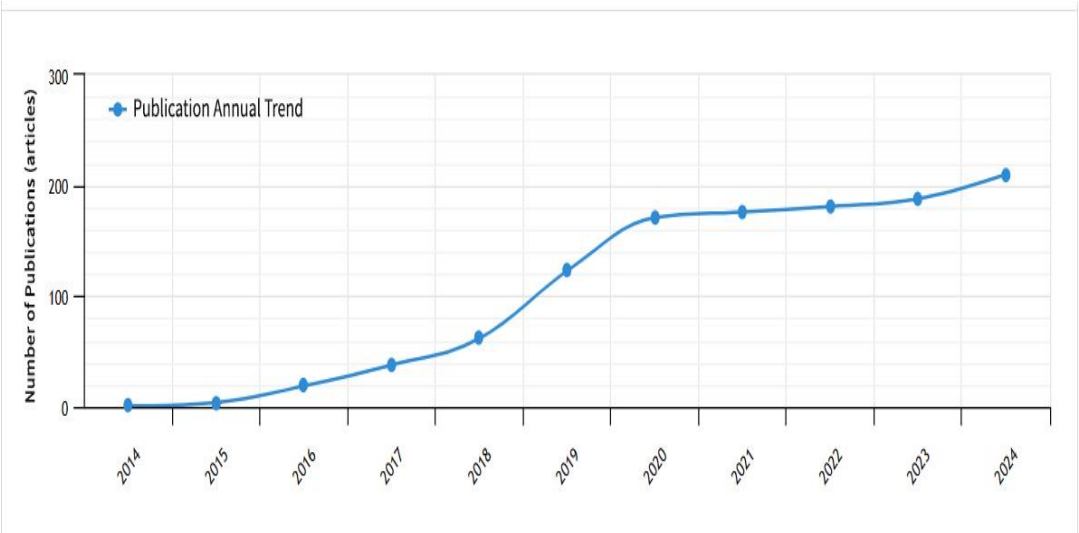

Figure 11 Annual trends in CNKI keyword searches for “OBE education”

Source: China National Knowledge Infrastructure (CNKI)

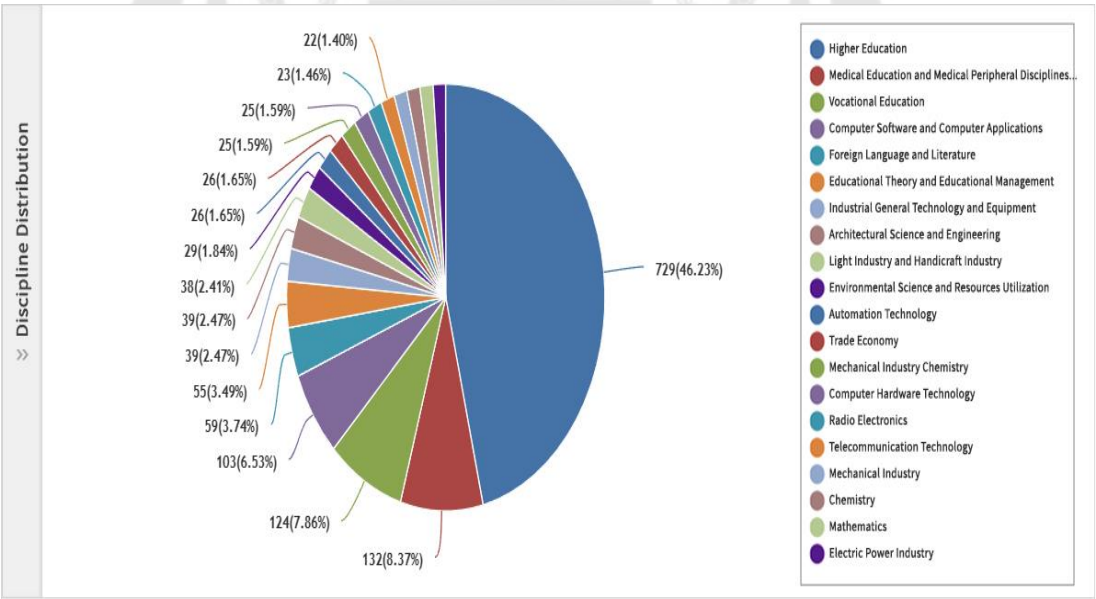

Figure 12 Distribution of searches for the subject “OBE education” in CNKI

Source: China National Knowledge Infrastructure (CNKI)

Table 12 Views of different scholars on practice competencies.

Perspectives	Scholars	Main points of view
OBE Concepts in General Education and Professional Classes	Banta(2007)	Apply OBE concepts to find ways to assess learning outcomes with significant results.
OBE Practices in the Language Arts Classroom	Battistini(2009)	Emphasize the important role of teachers in OBE practice for learning outcomes.
Assessment Methods of OBE Learning Outcomes	Ikenberry(2010)	In-depth study of the assessment methods of OBE and construction of the main procedures for the assessment of student learning outcomes.
The Impact of OBE Theory Implementation in Hong Kong, China	Kennedy(2011)	To study the impact of policy, theory and practice on the implementation of OBE and to promote the attention of OBE in the country.
Examination Mode Production under the Guidance of OBE Concept	Heena(2018)	To produce a university graduate examination model in mechanical engineering to evaluate the critical thinking of candidates.
The Application of OBE Concept in the Curriculum Reform of Health Professions	Er Hui Meng(2019)	Apply OBE concepts to improve the quality of graduating students and promote global mobility of health care workers.
The application of OBE concept in the construction of environmental design profession	Li, Dongze (2018)	Propose the problem of mismatch between university professional construction and social demand, and explore the construction plan of applied environmental design program.
The Application of OBE Concept in Practice Teaching in Colleges and Universities	Cao Lin et al. (2022)	Reform of applied practical education by combining workshop-based teaching with OBE concept.

In the field of environmental design, the application of OBE (Outcome-Based Education) is relatively rare, but some researchers have begun to explore its application in curriculum design and practice. To understand the research situation of OBE in environmental design, researchers combined "OBE" and "environmental design" for further research and found only 67 related documents, including 53 journal articles and 3 dissertations. In China, there are few cases of using OBE concepts to implement teaching reforms in environmental design majors, mainly applied to specific course design and practice. Cao Lin and others (2022) suggested that in the practical teaching

process of universities, integrating workshop work environments, processes, and content into the classroom can form a teaching method highly aligned with industry needs. In design majors, workshop-style teaching can highly replicate the design practice process and outcomes. Some applied universities guide their applied reforms with OBE educational philosophy, comparing the characteristics of workshop teaching with OBE teaching strategies, and found that the combination of workshop teaching and OBE philosophy can effectively promote applied practical education reforms in universities. Its teaching strategies can achieve the goal of cultivating talents that meet industry realities and have strong practical abilities, addressing issues such as incomplete applied reforms and regional limitations in applied scopes, helping applied universities to overcome current challenges. Zhao Xiangwei (2016) discussed the importance and existing problems of course design grading in environmental design majors, proposing to explore moderately quantitative grading methods for environmental design courses guided by OBE educational philosophy, and using specific courses as examples to illustrate key issues needing attention during implementation.

4.2 Theories of cooperative education

The World Association for Cooperative Education (WACE) explains the meaning of "cooperative education" as follows: "Cooperative education combines learning in the classroom with learning in the workplace, where students apply theoretical knowledge to the realities of relevant, often remunerative work for real employers, and then bring back to the classroom the challenges and insights gained in the workplace to help them analyze and reflect further in their learning. Students apply theoretical knowledge to relevant and often remunerative workplace situations for real employers, and then bring the challenges and insights gained on the job back to the classroom to help them further analyze and reflect on their learning"(Waryszak, 1999).

According to experts, "cooperative" in this context means a three-way collaboration between schools, students and employers, and "work" in this context means real work like that of ordinary professionals. Cooperative education was first implemented at the University of Cincinnati in 1906. The original understanding of

cooperative education was that it was a form of education that combined classroom instruction with work practice. As the theory of cooperative education has been enriched and practice has been explored, the expression of its connotation has changed over time and geographically. The National Council for Cooperative Education of the United States defines cooperative education as follows: "Cooperative education is a structured educational strategy that combines classroom learning with learning through productive work experiences in fields related to the student's academic or career goals, providing progressive experiences that integrate theory and practice. Cooperative education is a partnership between students, educational institutions, and employers, with each party having its own specific responsibilities." The cooperative education model refers to the collaboration between colleges and universities and businesses. Throughout the history of education in the United States, there have been two models of industry-university partnerships. One is the cooperative education model represented by the University of Cincinnati, and the other is the cooperative education model represented by Antioch University. The different models have different perspectives and perceptions, which play different roles in our understanding of cooperative education.

Table 13 Thematic Schools and Key Concepts of Cooperative Education.

Perspectives	Scholars	Main points of view
Skill-Based Learning and Career Orientation	University of Cincinnati	Emphasis is placed on skill acquisition in cooperation and on facilitating student employment after graduation. Collaboration with companies in applied disciplines such as engineering and architecture allows students to engage in social practice in companies and determine their future career paths at an early stage.
Whole Person Education	Antioch University, USA	Students are required to complete their studies through a "study-practice-learning" approach.

Regardless of the representation of the definition of cooperative education, as shown in Fig. The relationship diagram of cooperative education is shown, as in Fig. shows the interactive process diagram of school-enterprise cooperation, all of them are mainly defined from the following three aspects: first, cooperative education is an educational mode and educational strategy for cultivating human beings; second,

cooperative education is centered on the organic combination between theoretical learning in the classroom and production practice in enterprises; third, cooperative education is a kind of cooperative relationship, and the cooperative parties include schools, enterprises and students, and all parties have to Thirdly, cooperative education is a cooperative relationship that includes schools, enterprises and students, and all parties have to bear certain responsibilities in the process of cooperative education(Drysdale & McBeath, 2014).

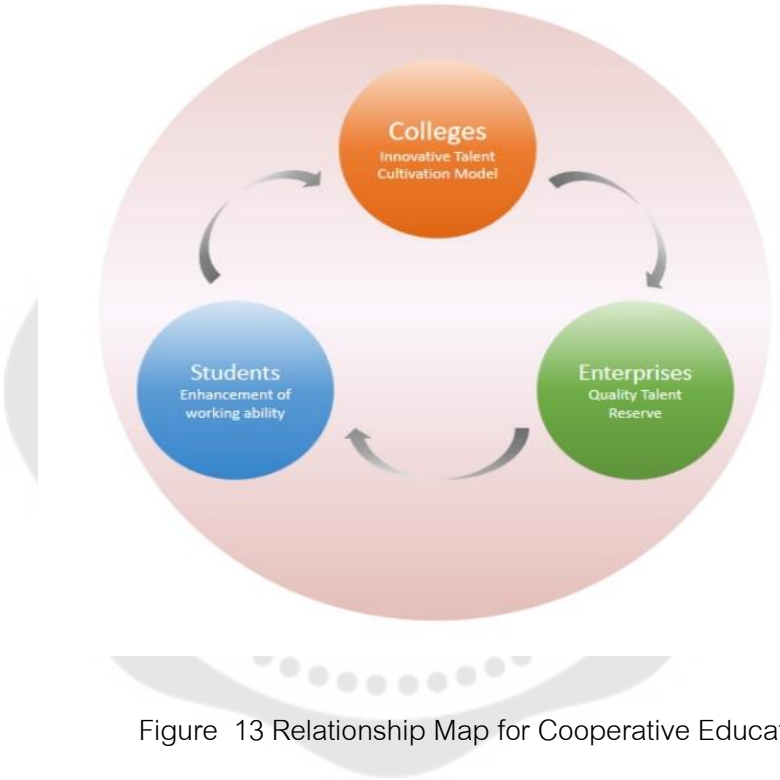

Figure 13 Relationship Map for Cooperative Education

Source: Zhao Yajun

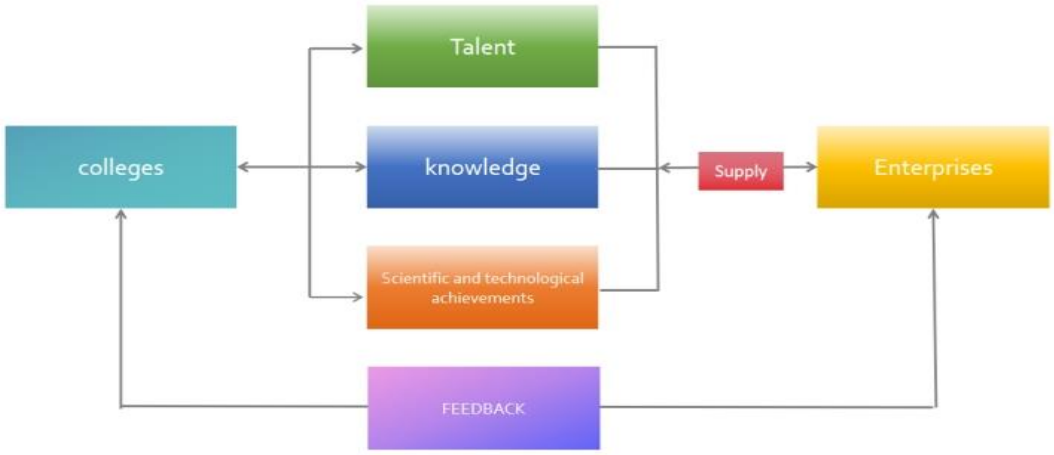

Figure 14 Interactive process diagram of school-enterprise cooperation

Source: Zhao Yajun

The researcher provided the main points of different scholars' studies related to cooperative education from different research perspectives. As shown in Table 14:

Table 14 Different scholars' views on cooperative education.

Research Perspectives	Scholars	Main points of view
The Role of Enterprises in School-Enterprise Cooperation	Kenneth G. Ryder	The role played by businesses in enhancing the seamless interface between schools and enterprises is examined.
The Role of Government in Cooperative Education	B Davis, National Science Board(1997)	The role of the U.S. government in safeguarding cooperative education in terms of allocation of research funds, formulation of policies and regulations is explored.
Research on the Innovation of Cooperative Education Mode in Higher Education	Dai Fuxiang (2011)	Focuses on new models and innovative practices of international cooperative education in China's higher education sector. It discusses how to improve the quality of education through international cooperation and enhance students' international vision and cross-cultural communication ability.

Analysis of Industry-University Cooperative Education Mode in China's Higher Vocational Education	Liu Shouyi (2006)	Analyzes the current situation and problems of university-industry cooperative education model in China's higher vocational education.
The Construction of School-Enterprise Cooperative Education Mode	Zhu Wenxiong (2008)	The construction methods and implementation strategies of school-enterprise cooperative education model are discussed.
Exploration of Industry-University-Research Cooperative Education Mode in China's Colleges and Universities	Wu Ping (2008)	The theory and practice of the cooperative education model of university-industry cooperation in Chinese colleges and universities are explored.
Review of American Cooperative Education Mode	Liu Changming (2007)	The cooperative education model in the United States is evaluated and analyzed.

Academic research on cooperative education has shown a diversified trend, but there is a general problem of insufficient research systematization. Foreign scholars tend to conduct detailed research from the perspectives of theoretical foundations, practice modes, and supportive roles of governments and enterprises, while Chinese scholars focus more on the basic modes of cooperative education, localized application of foreign experiences, and knowledge transfer. Nevertheless, domestic and foreign scholars have not yet conducted in-depth research on the operation mechanism of cooperative education, usually focusing on only one aspect of the concept, constituent elements, motivation mechanism and guarantee mechanism. The development of cooperative education in China faces multiple challenges, including the lack of special laws and regulations, a sound management system and evaluation system, the uncertainty of the operation mechanism and cooperation methods, the different understanding of cooperative education by various social sectors, the limitations of pilot practices, the lack of adaptation of the internal system of the school and the curriculum, and the lack of clarity of the roles and responsibilities of the participants. In order to promote the development of cooperative education, China needs to face up to these problems and seek improvement in reform. In the future, with the promotion of collaborative innovation among industries, universities and research

institutes, the development trend of cooperative education in China will be manifested in the increase in the number of participants, the extension of the scientific field, the expansion of globalization and the enlargement of the educational community, aiming to achieve the goal of comprehensive human education. Studying cooperative education and summarizing the advantages and disadvantages of each party can provide optimization suggestions and strategies for the operation mechanism of cooperative education in China, and theoretically elucidate its feasibility and rationality.

Through the study of cooperative education, on the basis of summarizing the advantages and disadvantages of each party, we can put forward suggestions and strategies for optimizing and constructing the operation mechanism of cooperative education in China, which theoretically explains the feasibility and reasonableness of the smooth implementation of cooperative education in China. For environmental design majors, the following strategies can be adopted for the application of cooperative education model: co-develop the curriculum with industry partners to ensure that the teaching content is in line with the needs of the industry. Design practice-based projects so that students can apply what they have learned in real work environments. Establish stable school-enterprise partnerships to provide students with internship and employment opportunities, and encourage more students, teachers and industry experts to participate in cooperative education. Through these strategies, the environmental design program can better utilize the cooperative education model to cultivate designers with innovative and practical abilities to meet the needs of the industry and society.

4.3 Constructivist Theory

Constructivist theory did not appear out of nowhere and has rich origins, with scattered studies of constructivist thought and practice throughout history. As a philosophy of learning, constructivism can be traced back to the 18th century Renaissance Italian philosopher Giambattista Vico that civilized societies are created by people, and that the process of creating societies also creates people themselves, who can, and can only, clearly understand everything they construct, and that there is a

great deal of similarity between children and society(Brandon & All, 2010). For example, they are strong in imitation, memory, and imagination, but weaker in reasoning1. Immanuel Kant, a famous German philosopher, synthesized rationalism and empiricism, emphasizing and systematically arguing for unity and human subjectivity, the free nature of man, meaning that man knows himself while knowing the world, and constructs and creates himself while constructing and creating the world. On this basis, John Dewey explains experience, arguing that the object of experience and the process of experience are inseparable, and that the center of experience is the subjective " creation" of the subject on the basis of the purposeful selection of objects, and that Dewey associates learning with context, which needs to occur in a certain social context. Dewey linked learning to context, which needs to take place in a certain social context in which learners create learning communities and construct their knowledge, and categorized the thinking process into difficult situations, problem identification, bold assumptions, rigorous reasoning, and careful proof. Psychology has made important contributions to the development of constructivism, which in the 1960s became known as Constructivism(Schcolnik et al., 2006).

In the 1960s, Constructivism was proposed by Piaget, who studied the laws of learning and cognition, and in the 1980s, Vygotsky proposed that learning is a social construction, and that individual student learning takes place in a certain historical and social context. In the 1990s, constructivism has developed and evolved on the basis of the convergence of postmodern social theory, philosophy, sociology of knowledge and the second cognitive revolution, and has become an important part of cognitive learning theory. In its continuous derivation and development, constructivism has been categorized into pedagogical constructivism, philosophical constructivism and sociological constructivism, while pedagogical constructivism can be divided into personal constructivism, radical constructivism and social constructivism. Later constructivism developed into several types such as socio-cultural cognition, information processing constructivism and cybernetic(Collins, 2008).Theory Systems View and

several other type. Different types have different perspectives and understandings (Table 15), which play different roles in our understanding of constructivism.

Table 15 Constructed Theme Genres and Key Connotations.

Perspectives	Scholars	Main points of view
Personal Constructivism	G. Kelly	Individuals construct knowledge alone by understanding recurring events; Knowledge is individual and adaptive.
Radical Constructivism	ErnstVon Glasersfeld	Knowledge is actively constructed by the cognitive subject, involving the accommodation and assimilation of new and old knowledge, which requires individuals to fully exert their subjective initiative. Learning is a process where individuals actively construct knowledge based on their experiences, rather than passively receiving and memorizing information and knowledge conveyed by teachers and textbooks. Teaching should provide students with authentic learning environments and tasks, allowing them to freely construct their own knowledge systems within these contexts.
Social Constructivism	J . Solmon	Knowledge is actively constructed, not merely reflected. It's a social construct, influenced by cultural contexts, shaping personality and emotions through social interactions. Language shapes thought patterns, foundational for cognition, not a neutral medium.

Among the various types of constructivism, although social constructivism has different schools, it shares similarities. It emphasizes the interaction between students as subjects and social reality in the learning process, arguing that students need to adapt to society and the objective world when constructing personal meanings and theories. Learning is not a simple transmission of knowledge but a process where students actively construct knowledge, selecting and processing external information, a process that cannot be replaced by anyone. Learning involves understanding, analyzing, and critiquing new knowledge, implying that knowledge needs to be contextualized. Constructivist theory views learning as an active outcome, with students as the main subjects in the learning process. Teachers should explore problems together with students to bridge the gap between the classroom and real life. Constructivist learning theory highlights "context, collaboration, communication, and meaning construction" as four key components.

Teachers need to design problems based on real contexts to promote communication and collaboration among students, minimizing differences among learners. Students' acceptance of knowledge relies on personal construction, which includes analyzing, synthesizing, and critiquing new knowledge. Constructivist learning theory suggests that teaching should be student-centered, allowing students to explore learning in real-world problem contexts to gain a true perception of the real world, making the acquired knowledge truly useful. In constructing the teaching model, this study emphasizes the creation of problem contexts, providing students with practical opportunities and leveraging teaching outcomes to adjust teaching activities. Constructivism emphasizes the significance of collaborative learning in mastering new knowledge, and this study focuses on creating a good collaborative and communicative environment for students during the model-building process, facilitating the success of all group members' learning. The teaching model of environmental design based on a simulated company constructed in this study is grounded in constructivist theory, focusing on students' active learning and meaning construction, enabling students to collaborate in real problem contexts.

This study develops a simulated company teaching model for environmental design majors in Xinxiang City, China, to enhance students' professional competencies. The literature review examines the global development of environmental design education and key student abilities—occupational adaptability, employability, innovation, and communication. The model, grounded in OBE, cooperative education, and constructivist theories, improves practical skills through simulated real-world environments. While existing research on simulated companies focuses largely on vocational education, this study addresses a gap by analyzing operational mechanisms and talent cultivation in environmental design programs across Italy, the UK, the US, and China. By incorporating cooperative teaching theories, this research offers new theoretical and practical insights for cultivating environmental design talent, enabling students to better grasp professional complexity and contribute to sustainable social development.

CHAPTER 3
RESEARCH METHODOLOGY

The purpose of this study was to explore whether the development of an "environmental design simulation company" as a pedagogical model could improve the work skills of environmental design students. The study was designed using the step-by-step approach of Mixed Method Research, which allows for a comprehensive and in-depth exploration of the research topic. This research method combines the strengths of quantitative and qualitative research, and the reliability and validity of this study is enhanced by the triangulation of the methodology.

The study was divided into three phases:

Phase 1: Analysis of Research Status and Identification of Problems. In the initial phase of the research, this study will comprehensively sort out the current situation and problems of the environmental design profession in Xinxiang City, Henan Province, China. Through literature review, questionnaires, and expert interviews. From there, data will be collected and analyzed to obtain quantification of behaviors and phenomena, and ultimately quantitative and qualitative data. The goal of collecting this phase is to gain an in-depth understanding of the current situation of environmental design education, identify

existing problems, and provide an empirical basis for the subsequent development of the teaching model;

Phase 2: Development of the Teaching Model. Based on the findings of the first phase, the researcher will start to develop a teaching model for environmental design students in colleges and universities in Xinxiang City, Henan Province, China. The model will be based on the concept of "environmental design simulation company", which aims to improve students' working ability by simulating a real company's operating environment. In this phase, the researcher will use the theories of pedagogy and design to construct a new student-centered teaching model;

Phase 3: Evaluation and Optimization of the Teaching Model. The final phase of the study will be the evaluation of the developed teaching model of "Environmental Design Simulation Company". The final phase of the study will be the evaluation of the model developed for the "Environmental Design Simulation Company". Feedback from teachers and industry experts will be collected through focus groups to assess the effectiveness of the model in enhancing students' work competencies. This phase of the study will focus on the feasibility, adaptability and practicality of the model, and based on the feedback results, the model will be adjusted and optimized as necessary to ensure that it can be applied in real teaching in the future.

Through these three phases, this study is expected to provide a validated pedagogical model for the enhancement of work competence of environmental design students in Xinxiang City, Henan Province, China. The model not only enhances students' competence, but also promotes a close match between education and industry needs, laying a solid foundation for students' future career development.

The purpose of this chapter is to report on the methods used for data collection and data analysis. The chapter is organized into six sections:

1.Scope of the study

2. Participants of the Study

3 .Research Instruments

4. Data Collection

5 .Data Analysis

6 .Research Design

1 Scope of the study

The selection of universities in Xinxiang City, Henan Province, as the scope of this study is primarily based on the following reasons: Henan Province is a major province in China in terms of both population and education. Xinxiang City, as an important educational hub within the province, possesses abundant higher education resources. In recent years, environmental design education in Xinxiang has made significant progress. Various institutions have enhanced teaching quality and students' practical skills through diversified educational models such as university-enterprise collaboration, integration of industry and education, and practical teaching reform. These institutions exhibit distinct regional characteristics and teaching strengths. However, certain issues still remain that require urgent resolution.

This study aims to construct an "environmental design simulated company" course model tailored to current educational needs and industry development by analyzing the current state of environmental design programs in universities in Xinxiang City, with the goal of improving students' professional competencies. The findings will not only supplement and enrich the existing education system but also provide references for other regions and institutions in their teaching practices, thereby contributing to the overall improvement of the quality of environmental design education. The representativeness and practical feasibility of universities in Xinxiang City in this professional field provide a solid practical foundation and research value for this study.

2 Participants of the Study

Four types of research objects were selected to satisfy phase 1 of the study: students majoring in environmental design at universities in Xinxiang City, Henan Province; managers of environmental design companies in Xinxiang City, Henan Province; well-known designers in Xinxiang City, Henan Province; and professionals in the field of environmental design education in Xinxiang City, Henan Province. These subjects were selecte

d with the aim of gaining an in-depth understanding of the current situation and needs of the environmental design profession in the city from different perspectives, in order to p romote the effective integration of education and practice. The following are the principl es of selection:

1: Environmental design students: The study participants consisted of all under graduate students majoring in Environmental Design across five universities in Xinxiang City, Henan Province, with a total target population of 1,312 individuals. A detailed demo graphic breakdown of the participant population is provided in Table 16. A census samp ling method was employed for questionnaire distribution, resulting in 518 valid response s. The adequacy of the sample size was verified with reference to Krejcie & Morgan's (1 970) sample size determination table, which recommends a minimum sample of 297 for a population of 1,300. The obtained sample of 518 far exceeds this threshold, indicating that the sample satisfactorily represents the target student population in the region and provides a reliable data foundation for subsequent research.

Table 16 Environmental Design Student Statistics in Xinxiang Colleges

School	Year	Number of Environmental Design majors	Total number of students
Henan Normal University	Year 1	60	195
	Year 2	45	
	Year 3	45	
	Year 4	45	
Henan Institute of Science and Technology	Year 1	94	186
	Year 2	31	
	Year 3	31	
	Year 4	30	
Henan Institute of Technology	Year 1	119	453
	Year 2	124	
	Year 3	120	
	Year 4	90	
Xinxiang University	Year 1	83	329

	Year 2	80	
	Year 3	82	
	Year 4	84	
Xinxiang Institute of Engineering	Year 1	37	149
	Year 2	37	
	Year 3	37	
	Year 4	38	

Through the results of the questionnaire survey of environmental design students, the researcher was able to draw out the current status and problems of the environmental design program in the region, the current state of teaching at present and what kind of expectations are there for the environmental design program in the simulation company course?

2: Design Firm Managers: This study rigorously selected 3 managers of environmental design firms in the Xinxiang area of Henan Province, China, using a purposive sampling method to ensure the representativeness and depth of the study population. The selection criteria were rigorous and detailed, including the following: experience, participants must have at least 5 years of experience in the environmental design industry to ensure that they have a wealth of industry knowledge and practical experience. Positional requirements: the selected manager should have held a key decision-making and management role in the company, such as company founder, general manager or design director, to ensure that he/she has a deep insight into the company's operation and design process. Firm size: The selected manager's design firm should be of a certain size, with at least 30 employees, in order to reflect the firm's stability and influence in the industry. Educational background, with preference given to managers with a background in environmental design or related disciplines, especially those with a bachelor's degree or higher, to ensure that their theoretical foundation is integrated with their professional practice. Awards and social recognition, selecting managers who have won national, provincial or municipal awards in the field of environmental design, as well as those professionals who have a good reputation and are highly regarded in the community, in order to highlight their professional achievements and recognition in the industry. Willingness to particip

ate, to ensure that the selected managers have a positive willingness to participate in thi s study and a high degree of cooperation, and are willing to openly share their experien ces and professional insights in order to promote the depth of the study and the richnes s of the results.

3: Well-known designers: In this study, the researcher adopted a purposive sa mpling method to rigorously select 3 prominent and well-known designers in the Xinxian g area of Henan Province, China. The selection principles strictly followed the following criteria: social influence and popularity. We focused on those designers who have signifi cant social influence and leadership within the environmental design industry, and who have established their authority and recognition through publishing professional articles and holding key positions in industry associations. The work of these designers is not on ly widely recognized and appreciated in the industry, but also reflects their good visibilit y and reputation in the field of environmental design; richness and diversity of work, we prioritize designers whose work is rich and diverse, ensuring that their designs cover a wide range of project types, thus demonstrating their outstanding talent and innovative t hinking in different design fields; industry experience, we We pay special attention to the experience of the designers, and select designers who have at least 10 years of experi ence in the environmental design industry, this accumulation of experience ensures that they have depth and breadth in the field of specialization. Educational background, we also considered the educational background of the designers, and gave preference to t hose designers who have a bachelor's degree or higher in environmental design or arch itectural design, etc., to ensure that they have a solid foundation of professional theory a nd knowledge. Willingness to participate, we ensured that the selected designers were highly motivated to participate in this study.

4: Professionals in the field of environmental design education: This study will u se a purposive sampling method to select professionals in the field of environmental des ign education from universities in Xinxiang, Henan Province, China, including directors i n the field of education, educational supervisors, school administrators, heads of profes sions, and teachers of specialized courses with relevant knowledge and experience, an

d finally identify 4 qualified candidates. Specific selection criteria include: for their teachi ng experience, professors or professional leaders with rich teaching experience in the fi eld of environmental design are required to be selected, with at least 10 years of relevan t teaching experience; for professional background, priority is given to professors or prof essional leaders with a background in environmental design or related professions, such as a master's degree or higher in architectural design, interior design, and other related disciplines; for educational level, professors or professional leaders with more experien ce in the field of environmental design education are considered. For education level, pr ofessors or professional leaders with higher education level, such as doctoral degree or professional qualification equivalent to doctoral degree, are preferred; for teaching achi evements, professors or professional leaders who have made significant achievements and accomplishments in teaching, such as excellent teaching awards or relevant teachi ng papers, are preferred; for influence, professors or professional leaders are preferred to have certain social influence in their professional fields. For influence, ensure that the selected professors or professional leaders have certain social influence and academic status in their professional fields, such as holding positions in industrial associations or s erving as editorial board members in academic journals, etc.; for consideration of willing ness to participate, ensure that the selected administrators have a positive willingness to participate in the research and cooperate with each other, and are willing to share their own experiences and insights.

To ensure the depth of the research, the professional backgrounds of the partic ipants in the evaluation and optimization of the teaching model were diversified, coverin g students, teaching management, academic research, enterprise management, and de sign practice. This ensured the comprehensiveness and diversity in the development of the teaching model. The selection of members' professional levels took into account the different needs of teaching and management, market practice, involving multiple aspect s including teaching, management, practice, and market. This ensured that the develop ment, design, and adjustment of the “Simulated Company” teaching model for the Envi ronmental Design major at Xinxiang University in Henan Province could comprehensivel

y enhance students' work capabilities and ensure that the teaching model design met C hina's national strategies and educational quality standards. A focus group study was c onducted.

3 Research Instruments

This study employed four primary research instruments: questionnaires, Item-O bjective Congruence (IOC) validation, semi-structured interviews, and focus groups.

3.1For Research Objective 1

Two instruments were utilized for data collection: questionnaires and semi-struc tured interviews.

1. Questionnaire Survey

(1) Questionnaire Design: Based on the research objectives and conceptual framework, the questionnaire was structured into five sections comprising a total of 62 items, including single-choice and 5-point Likert-scale questions. The sections are as follows: Part 1: Title, researcher information, key term definitions, participant consent, and ethical assurances; Part 2: Basic demographic information (6 items), including gender, grade, age, origin, and major; Part 3: Core survey (8 items) using a 5-point scale to assess current performance and future expectations regarding simulated company courses, internships, career readiness, and curriculum impact; Part 4: Curriculum status and future needs assessment (38 items) evaluating satisfaction with current environmental design education and industry awareness; Part 5: Specific needs for future "Simulated Company" courses (10 items) covering content, interaction, practical components, and evaluation. Scale anchors were defined as: 5 = Highest level, 4 = High, 3 = Medium, 2 = Low, 1 = Lowest.

(2) Content Validity Assessment via IOC: To ensure the content validity of the questionnaire, the Item-Objective Congruence (IOC) method was employed. A panel of five experts—including two educational administration experts, two teaching specialists, and one industry designer—was invited to evaluate the items. The acceptability threshold for the IOC was set at $\geq$0.50. The results showed that all 62 items met the acceptable criteria, with 36 items achieving an IOC of 1.0, 22 items

scoring 0.8, and 4 items scoring 0.6 (located in Part III-5: Items 10 and 13; Part IV: Items 4 and 7). The overall average IOC value was 0.903. For the items with an initial IOC of 0.6, the researchers conducted further review and discussion based on expert feedback, ultimately deciding to retain and modify them accordingly.This process further enhanced the content validity of the questionnaire (see Appendix for details).In conclusion, the questionnaire was recognized by experts for its systematic and comprehensive design, effectively covering all key dimensions of this study and reliably reflecting actual conditions and core issues.

(3)Questionnaire Administration: The validated questionnaire was administered to environmental design students in Xinxiang, Henan, China.

2. Semi-Structured Interviews

Semi-structured interviews were conducted with ten experts (design company managers, renowned designers, and education professionals). The interview protocol covered themes such as: Perspectives on current environmental design education, Experiences and evaluations of simulated company teaching models, Essential student competencies, and Suggestions for curricular improvements.

To ensure trustworthiness, measures included expert review of the interview protocol, pilot testing, member checking, and triangulation with other data sources.

3.2 For research objective 3: Confirm the applicability and feasibility of the environmental design teaching model:

A focus group was convened with seven members (1 moderator, 3 expert mem bers, 3 regular members), including four education authorities and three industry expert s. The discussions aimed to: Evaluate the effectiveness of the "Simulated Company" teac hing model,Gather practical feedback from educational and industrial perspectives, and Identify unforeseen challenges and areas for improvement.

The focus group format allowed for open discussion, iterative refinement of the teaching model, ensuring both theoretical soundness and practical applicability.

4 Data Collection

In this study, the data collection process followed the following steps:

(1) Literature review: The researcher explored the teaching model of a simulated company for improving the capabilities of environmental design students by conducting an in-depth analysis of relevant literature and existing research.

(2) Questionnaire Survey: Researchers opted for a questionnaire survey. The quality of the questionnaire was measured using the IOC. The data collection instrument was created based on a review of relevant concepts, theories, literature, and research. Prior to the design of the teaching model, a survey questionnaire was administered to the students involved in the study, specifically targeting students majoring in Environmental Design for a Priority Need Index (PNI) survey. The purpose of this questionnaire was to gather data from Environmental Design students regarding their current capability status and desired conditions.

(3) Semi-structured interviews: Semi-structured interviews were conducted with key informants listed in Table 11, including the owner and famous designer of Henan Xinxiang Design Company, the director of environmental design education, education supervisors, school administrators, professional heads, and professional course teachers with relevant knowledge and experience, to gain in-depth insights. The informants were qualified to conduct semi-structured interviews in various aspects. In order to ensure the integrity and rigor of the research conclusions, the interview outline and interviewees were determined based on a preliminary understanding of the simulated company and focusing on the research questions. Both online and offline methods can be selected. Before the interview begins, the interviewee will be briefed on the main content of the interview, which will focus on the development of the environmental design industry and the industry's demand for the professional work ability of graduates. The academic purpose of this research will also be explained, as well as the promise to keep the content of the interview confidential, so that the interviewee can reflect the situation more honestly and frankly. To ensure the authenticity and accuracy of the subsequent transcription of the interview text, each interview will be recorded with permission, and each interview will be contro

lled at 20-30 minutes. The interview ends when no more effective new ideas can be obta ined. During the interview, the interviewer works in pairs, with one person responsible for communication and the other for recording key information.

(4) Model draft design: Based on the collected data, the researcher designs a draft of a simulated company teaching model for improving the capabilities of environme ntal design students.

(5) Focus Group Discussions: The researcher submitted the draft model to a fo cus group for review. Following the initial design of the teaching model, an expert panel was invited to participate in a focus group discussion. This session was conducted offlin e in a closed conference room to facilitate open dialogue. The aim was to gain insights i nto the details and perceptions of the simulated teaching model to identify areas for imp rovement and refinement. Ultimately, these experts provided an effectiveness evaluation of implementing the simulated company teaching model for the Environmental Design major.

(6) Revision of the draft model design: Based on the suggestions of the focus g roup, the researcher made the necessary revisions and improvements to the draft model.

(7) Summary and outlook of the completed model design: The researcher and t he focus group further summarized the revised model and finalized the “Environmental Design Simulation Company Teaching Model (Final Edition)”.

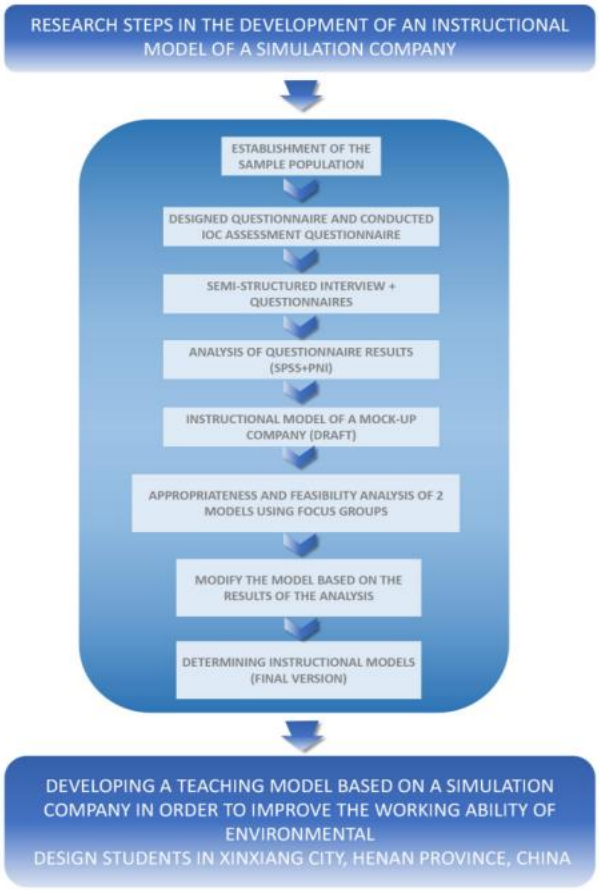

Figure 15 Research Procedure Diagram

Source: Zhao Yajun

5 Data Analysis

In order to ensure the completeness and rigor of the findings, multiple data analyses will be used to analyze the data in this study, including the Krejecie & Morgan Data Research Method, PNI, Finding Standard Deviation, IOC, Cronbach's alpha coefficient, Mean, Percentage, and Bartlett's test of sphericity.

(1) Krejecie & Morgan Data Analysis Method :was employed to determine the statistically representative sample size for this survey study, ensuring both reliability and validity. With a total population of 1,312 environmental design students, the required sample size was determined using Krejecie and Morgan's reference table, resulting in a targ

et of 297 students. This sample size is considered appropriate for the study, as it ensure s data representativeness, supports robust analysis, and maintains practicality in data c ollection and interpretation. The approach enhances both the accuracy of the findings a nd the feasibility of the research process.

Krejcie and Morgan Estimation of sample size in research using Krejcie and Mo rgan is a commonly employed method. Krejcie and Morgan (1970) used the following for mula to determine sampling size:

$$s = X^2NP(1-P)/d^2(N-1)+X^2P(1-P)$$

$s =$ required sample size

$X^2 =$ the table value of chi-square for one degree of freedom at the desired co nfidence level

$N =$ the population size

$P =$ the population proportion (assumed to be .50 since this would provide the maximum sample size)

$d =$ the degree of accuracy expressed as a proportion (.05)

(2) Modified Priority Need Index, PNI Modified (PNI): The Priority Need Index (P NI) is a quantitative analysis method used to prioritize needs or preferences according t o their importance or urgency. it involves assigning numerical values to different factors or criteria and calculating a score to prioritize each factor. It involves assigning numeric al values to different factors or criteria and calculating an index score to prioritize each f actor.The PNI can provide a systematic and objective way to analyze and prioritize the n eeds of a target population.The PNI is usually a composite index derived from weighing and evaluating a variety of need factors. The calculation of the PNI allows for a more obj ective assessment and comparison of the importance of different needs to each other fo r targeted policy and program development.

PNI Modified is calculated as $\text{PNI Modified} = \frac{I}{D}$,where I is the average expect ed role and D is the realistic role average.

(3) Find the Standard Deviation:

The formula for calculating the standard deviation : $S.D. = \sqrt{\frac{\sum (X-\bar{X})^2}{N-1}}$, where $\sum (X - \bar{X})^2$ represents the squared difference between each score and the mean, and, N is the total number of observations. 。

(4) Index (IOC):

IOC analysis is a process whereby an expert's IOC value is derived from an expert's review of the research questionnaire, which is the accuracy value of the questionnaire. Depending on the question in question, the expert rates the extent to which individual topics agree or disagree with the specific objectives listed by the test developer. Depending on the question in question, the expert rates the extent to which individual topics agree or disagree with the specific objectives listed by the test developer.

score +1 if you are sure that the question was measured against the objectives; Score 0 if you are unsure if the question was measured against the objectives;Score -1 if you are certain that the issue being tested did not meet the objectives.

The IOC index is calculated by the formula.

$$\mathbf{IOC} = \frac{\sum \mathbf{R}}{\mathbf{N}}$$

IOC = consistency of objectives and test methods.

$\sum$R=Total number of expert review scores.

N= Total number of experts.

Criteria:questions with an IOC value of 0.50-1.00 have an accuracy value that can be used;questions with IOC values below 0.50 must be improved and cannot be used.

(5). Calculate the reliability of the test (Cronbach's alpha coefficient):

Cronbach's alpha coefficient formula is: $\alpha = \frac{k}{k-1} \times \frac{S_t^2}{S_t^2+(k-1)S_i^2}$, where $k$is the number of items in the instrument, $S_t$is the variance of the total scores, $S_i$is the sum of variances of each individual item.

$$\alpha = \frac{k}{k-1} \times \frac{S_t^2}{S_t^2 + (k-1)S_i^2}$$

k

S_t

(6) Find the mean (Mean):

The mean calculation formula is: $\bar{X} = \frac{\sum X}{N}$, where $\sum X$ is the sum of all scores, and N is the total number of observations.

$$\bar{X} = \frac{\sum X}{N}$$

Find Percentage (Percentage): Used to calculate the percentage of data to the total.

(7) KMO (Kaiser-Meyer-Olkin) test and Bartlett's test of sphericity are two statistical methods commonly used in factor analysis to assess the applicability of data.

Kaiser-Meyer-Olkin (KMO) Test:

The KMO value is calculated using the following formula:

$$KMO = \frac{\sum_{i \neq j} r_{ij}^2}{\sum_{i \neq j} r_{ij}^2 + \sum_{i \neq j} p_{ij}^2}$$

Where:

r_{ij} is the simple correlation coefficient between variables i and j.

p_{ij} is the partial correlation coefficient between variables i and j.

The numerator is the sum of the squares of all simple correlation coefficients.

The denominator is the sum of the squares of the simple correlation coefficients and the squares of the partial correlation coefficients.

(8) Bartlett's test of sphericity:The calculation for Bartlett's test is more complex and is based on the elements of the correlation matrix to assess the correlations among variables. The null hypothesis of the test is that the observed correlation matrix is equal to the identity matrix, indicating no correlations among the variables. The test statistic X^2 for Bartlett's test is calculated as:

$$X^2 = -\left(N - 1 - \frac{2p+5}{6}\right) \ln |R| + \left(N - 1 - \frac{p+1}{3}\right) \ln |I_p|$$

Where:

N is the sample size.

p is the number of variables.

R is the correlation matrix.

I_p is the p-order identity matrix.

$|R|$ and $|I_p|$ are the determinants of matrices R and I_p, respectively.

In denotes the natural logarithm.

6 Research Design

This research design is divided into 3 steps, which aim to develop and validate a teaching model of a simulated company for improving the capabilities of students maj oring in environmental design. The researcher explained the research design flowchart i n detail, and drew a flowchart to assist in the explanation:

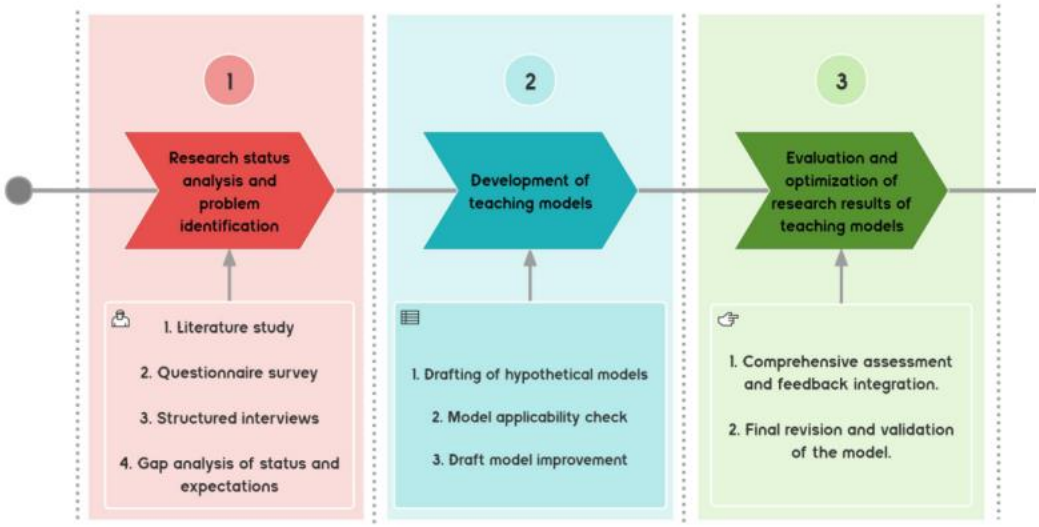

Figure 16Research design flowchart

Source: Zhao Yajun

The 1 phase involves the analysis of the current situation and identification of ex isting problems. This stage is intended to gain an in-depth understanding of the status q

uo in environmental design education, ensuring that the development of the teaching mo del is grounded in practical reality. Specific steps include: conducting a literature review to gather and analyze relevant theories and research; designing and administering a 5-point Likert scale questionnaire to assess both the current state and desired conditions of environmental design students; validating and revising the questionnaire through the I ndex of Item-Objective Congruence (IOC); distributing the questionnaire and performing data analysis using the modified Priority Needs Index (PNI) formula to rank needs; carry ing out semi-structured interviews with 10 educational experts and industry managers to gain deeper insights into current conditions and expectations for improving student co mpetencies; and finally, summarizing the gaps between current and desired states throu gh gap analysis, leading to the formulation of capability improvement guidelines and a d raft teaching model.

The 2 phase focuses on the development of the teaching model. This stage aim s to translate the information and analyses obtained in the first phase into practical instru ctional strategies and tools. First, a preliminary hypothetical model is drafted based on t he literature review, situational analysis, and interview results. This is followed by a focus group study involving seven experts from diverse backgrounds including academia, tea cher development, industry practice, and educational management to evaluate the appli cability and feasibility of the draft teaching model. Revisions and refinements are then m ade based on the experts' feedback.

The 3 phase entails the evaluation and optimization of the teaching model outco mes. This stage emphasizes assessing the feasibility and suitability of the simulated co mpany teaching model without experimental testing, concentrating instead on the struct ured evaluation and refinement of the developed model. Specific activities include colla borating with educational experts, industry representatives, and management scholars t o conduct a comprehensive evaluation of the revised model covering theoretical foundat ion, practicality, innovativeness, and compatibility with the existing educational system; collecting, analyzing, and integrating expert feedback in detail to identify recommendati ons for incorporation into the model; and finally, making final revisions based on the com

prehensive evaluation and feedback, followed by re-validation by the expert panel to en sure full review and endorsement prior to implementation.

Through this systematic research process, the simulated company-based teach ing model is ensured to be scientifically sound and practically feasible, effectively suppo rting the enhancement of professional competencies among environmental design stude nts.

CHAPTER 4
RESEARCH RESULT

This study aims to fulfill the following research objectives :1.To study the state and problem of environmental design major in Xinxiang, Henan, China. 2.To develop the curriculum model of environmental design to enhance competency for the university in Xinxiang, Henan, China. 3.To Confirm the curriculum model of environmental design to enhance competency for the university in Xinxiang, Henan, China.

The study is divided into three phases: 1.Current situation analysis and problem identification, where data is collected through literature review, questionnaire surveys, and expert interviews to gain an in-depth understanding of the current state of environmental design education and to identify problems; 2. Development of the teaching model, based on the results of the first phase, to construct a student-centered "Environmental Design Simulation Company" teaching model; 3.Evaluation and optimization of the teaching model, where feedback is collected through focus groups to assess the effectiveness of the model, and adjustments and optimizations are made based on the results.

1 Analysis of the Current Situation and Problems of Environmental Design Specialties (Corresponding to Research Objective 1)

1.1 Questionnaire Data Analysis

To systematically investigate the current teaching status, students' capacity development needs, and the direction for teaching model reform within the environmental design program, this study initially employed a quantitative research method utilizing a questionnaire survey. The questionnaire encompassed multiple dimensions, including respondents' basic information, their learning status and core issues, employment perceptions and career development needs, as well as their willingness regarding the development of a "Simulated Company" course model. This aimed to provide empirical support for the subsequent construction of the teaching model. The study targeted the entire undergraduate student population majoring in environmental design across five universities in Xinxiang City, Henan Province (total

population: 1,312 individuals), conducting a census survey. Ultimately, 518 valid questionnaires were collected. The sample covered different genders, academic years, and institutions, ensuring good representativeness and statistical power.

1.1.1 Sample Population Profile

The basic information collected about the sample population profile for this study is shown in the table below:

Table 17 Descriptive statistics of demographic variables of the subject sample (N=518)

Informatio	Options	Number of people	Percentage (%)
Gender	Female	353	68.15
	Male	165	31.85
Year	Year 3	150	28.96
	Year 1	148	28.57
	Year 2	124	23.94
	Year 4	96	18.53
Age	18-20 years old	240	46.33
	21-22 years old	208	40.15
	23-25 years old	66	12.74
	26 years old and above	4	0.77
University	Henan Institute of Science and Technology	139	26.83
	Henan Institute of Technology	104	20.08
	Henan Normal University	103	19.88
	Xinxiang University	94	18.15
	Xinxiang Institute of Engineering	78	15.06
Specialty	Environmental Design	510	98.46
	Other majors	8	1.54

Table 17 presents a descriptive statistical analysis of the basic characteristics of the sample population. The study collected 518 valid questionnaires from undergraduate students majoring in Environmental Design across five universities in Xinxiang City, Henan Province.The gender distribution indicates a notable predominance of female students, who accounted for 68.15% of respondents, compared to 31.85% for males. This suggests a higher level of female participation in

the program, which may reflect either a greater inclination among women toward the design field or the particular appeal of this major to female students. Despite their smaller representation, male respondents provided valuable diverse perspectives on course feedback and educational needs.In terms of grade level, juniors constituted the largest proportion at 28.96%, implying that their needs and feedback should be accorded particular attention in curriculum design and teaching improvement efforts. Seniors, representing the smallest group at 18.53%, may have more urgent needs related to career preparation and employment guidance, given their proximity to graduation.Age distribution was concentrated primarily in the 18–20 and 21–22 age groups, accounting for 46.33% and 40.15% of respondents, respectively. This indicates that students within these age ranges form the core demographic of the Environmental Design major, highlighting the youth of the student population in this field.Regarding institutional distribution, Henan Institute of Science and Technology contributed the largest number of participants, comprising 26.83% of the sample. As the most represented institution, feedback from its students may carry significant weight in the analysis of educational needs within the Environmental Design major. Students from Henan Normal University and Henan Institute of Technology accounted for 19.88% and 20.08%, respectively—together representing nearly two-fifths of the total sample—making them important stakeholders in educational improvement initiatives.

Students from Xinxiang College and Xinxiang Engineering College also constituted considerable proportions, contributing diverse educational backgrounds and perspectives.These data not only illustrate the diversity and representativeness of the sample but also provide a robust foundation for understanding student needs. Awareness of these distributional characteristics is essential for developing inclusive instructional programs and tailored course content. For educators and curriculum designers, such information is critical in formulating targeted and effective teaching strategies that accommodate students from varied backgrounds.

1.1.2 Exploration of the Current Situation and Problems of Environmental Design Students

The purpose of this research is to collect the current status and needs of students, in order to more clearly understand the current situation and existing problems. As shown in the table below:

Table 18 Attitudes and needs of environmental design students towards their job prospects and career development.

Informatio	Options	Number of people	Percentage (%)
Will you choose to stay and work in Xinxiang City, Henan Province in the future?	Maybe	260	50.19
	No	161	31.08
	Not at all	82	15.83
	Will	12	2.32
	Will definitely	3	0.58
What are the reasons for choosing to leave Xinxiang, Henan Province to work in other cities?	Career opportunities	363	70.08
	Industry development	322	62.16
	Salary level	369	71.24
	Educational resources	183	35.33
	Quality of life	267	51.54
	Other	76	14.67
How many times have you participated in internships for environmental design majors?	No	368	71.04
	1-2 times	141	27.22
	3-4 times	6	1.16
	5 times or more	3	0.58
What kind of problems have you encountered while participating in internships in the environmental design program?	Professional skills	334	64.48
	Teamwork	222	42.86
	Communication	215	41.51
	Problem solving	183	35.33
	Time management	167	32.24
	Other	102	19.69
What do you think is the main career direction for graduates of the Environmental Design program?	Interior Design	386	74.52
	Freelance	50	9.65
	Landscape Design	31	5.98
	Architectural Design	18	3.47
	Other	17	3.28
	Education and research	16	3.09
What are your concerns about	Lack of practical experience	396	76.45

future employment?	Lack of professional skills	378	72.97
	Fierce competition in the industry	375	72.39
	Unclear career development path	317	61.2
	Other	21	4.05
What abilities do you think the simulated company program has improved?	Practical ability	393	75.87
	Career adaptability	378	72.97
	Employability	375	72.39
	Communication and coordination skills	323	62.36
	Innovation and entrepreneurship	303	58.49
	Project Management and Leadership	260	50.19
	Other	20	3.86
In what ways would you like to see the simulated company Program improve the current professional curriculum?	Practical aspects	427	82.43
	Course content	333	64.29
	Teaching interaction	309	59.65
	Evaluation system	176	33.98
	Other	17	3.28

Based on the data analysis presented in Table 18, it is evident that current environmental design students exhibit considerable hesitation regarding their employment choices in Xinxiang City. While a significant majority (50.19%) maintained a wait-and-see attitude, only a small fraction (2.9%) expressed a definite willingness to remain. Conversely, a large proportion (46.91%) expressed a clear unwillingness to seek local employment. This collective skepticism reflects profound underlying concerns about the opportunities and prospects within the regional job market.

The high level of student concern regarding salary levels (71.24%) and career opportunities (70.08%) underscores the importance placed on economic considerations and professional growth potential in future employment. Furthermore, the finding that 71.04% of students lacked formal internship experience within the environmental design field reveals substantial gaps in the development of practical professional skills. This deficiency not only compromises career readiness but may also diminish graduates' competitiveness in the job market;The challenges reported during placements, particularly in professional skills (64.48%) and communication skills

(41.51%), indicate a pressing need for enhanced training and support in these crucial areas. Regarding career path preferences, interior design emerged as the predominant choice among graduates (74.52%), while freelancing accounted for 9.65% of responses, reflecting both the continued appeal of traditional specializations and a growing interest in flexible work arrangements;Notably, 76.45% and 72.97% of students expressed concerns about insufficient practical experience and lack of professional skills, respectively, highlighting the urgent need to strengthen practical education and skills training. Correspondingly, 75.87% and 72.97% of respondents expressed hope that enhanced coursework could improve their practical abilities and career adaptability, while 82.43% anticipated improvements in practical course components, demonstrating strong demand for pedagogical approaches that integrate theoretical and practical learning. Additionally, 64.29% and 59.65% of students called for improvements in course content and teaching interactions, indicating a preference for more interactive and participatory educational methods.

In summary, environmental design students demonstrate significant concern about their employment prospects, particularly regarding remuneration and professional development opportunities. The primary challenges they face include inadequate internship experience and insufficient practical skills development. Consequently, educators should prioritize implementing interactive, experiential teaching methodologies, supplemented by enhanced career guidance and expanded internship opportunities, to facilitate effective career planning and overcome employment barriers. Innovative pedagogical models, such as simulated company approaches, show considerable promise for enhancing students' comprehensive professional competencies and strengthening their competitiveness in the evolving job market.

1.1.3 Students' Attitudes and Needs towards Employment Prospects and Career Development

The analysis is specifically structured along the following six dimensions: Attitudes towards the environmental design profession; Attitudes towards the current state of teaching and learning in the curriculum; Knowledge of developments in the

environmental design industry; Attitudes and Expectations of the Simulation Company Program; Competencies to be cultivated by students to adapt to the job requirements of enterprises; Survey related to the design of the "Simulation Company" course.

To enhance interpretability of the results, the dimensions were ranked according to the Priority Needs Index (PNI), PNI values in this study are calculated with rounding to two decimal places permitted. with higher PNI values indicating areas of greater perceived need.The questionnaire employed a five-point Likert scale, with the following specific evaluation criteria applied to score interpretations:

Table 19 Five-Point Likert Scale Scoring and Interpretation Criteria

Mean Range	Rating
4.51-5.00	Very high
3.51-4.50	High
2.51-3.50	Medium
1.51-2.50	Low
1.00-1.50	Very low

This table 19 defines the interpretation criteria for the five-point Likert scale used in the questionnaire. Scores are categorized into five levels based on the mean value ranges, reflecting the degree of respondent agreement or satisfaction. Specifically, ratings between 4.51 and 5.00 denote a very high level of satisfaction, while scores from 1.00 to 1.50 reflect a very low level. This scale facilitates the quantification of subjective perceptions and enables consistent interpretation of responses across survey items.

Table 20 Six-Dimensional Descriptive Analysis of Competency Improvement Needs and "SimCorp" Curriculum Model Development (N = 518)

Dimensional	Satisfaction		Needs		PNI
	M	SD	M	SD	

Attitudes towards the Environmental Design Major	3.48	0.82	3.59	0.80	0.11
Attitude towards the current status of teaching and learning in the programme	3.43	0.79	3.51	0.76	0.08
Understanding of the development of the environmental design profession	3.41	0.75	3.49	0.75	0.08
Attitude and expectation of the simulation company course	3.64	0.84	3.70	0.83	0.08
Attitudes towards the job requirements of the company and the related abilities to be cultivated	3.42	0.74	3.50	0.74	0.06
Regarding the design of the simulation company course	3.64	0.78	3.70	0.78	0.06

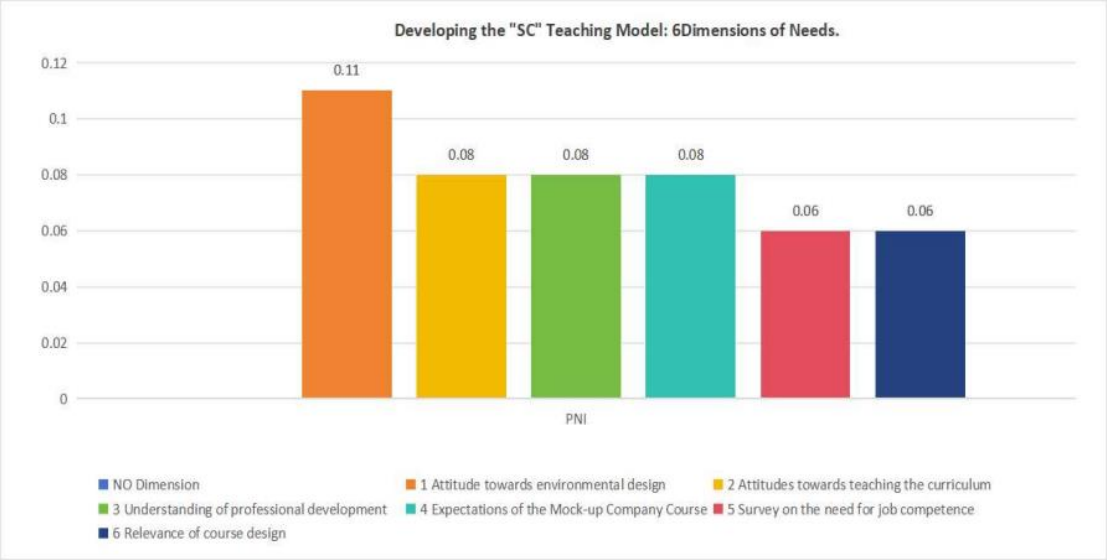

Figure 17 illustrates the histogram of needs pertaining to the development of the "SC" course model for competency enhancement from the perspective of environmental design students.

Source: Zhao Yajun

Based on the statistical analysis of the survey, the discrepancy between students' satisfaction with various aspects of the environmental design major and their corresponding level of demand was quantified using the Priority Needs Index (PNI), allowing for a systematic prioritization of improvement needs. The findings reveal that

students' attitudes toward the environmental design major itself exhibited the highest level of demand (PNI = 0.11), signaling strong expectations for the program to more effectively support their career development and personal interests. This was followed by their understanding of the current teaching and learning status (PNI = 0.08) and the development of the environmental design profession (PNI = 0.08), reflecting concerns over curriculum relevance and professional prospects, as well as a desire for the program to better align with industry trends and offer clearer career guidance. Additionally, a considerable need was identified regarding alignment with corporate job requirements and the development of relevant competencies (PNI = 0.08), underscoring students' awareness of their limited career preparedness and a perceived need for enhanced practical and professional training. In contrast, attitudes and expectations toward the simulated company course, along with its instructional design, received relatively lower priority scores (PNI = 0.06), yet still indicated a positive reception of this innovative teaching method as a means to strengthen practical skills and employability. Collectively, these results provide an empirical foundation for refining the teaching model, highlighting targeted areas for curricular and pedagogical enhancement to better meet student needs, improve educational quality, and facilitate competency development.For the sake of further research, the 6 dimensions are analysed in more detail below:

Table 21 Students' attitudes toward the environmental design program

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
You are interested in the Environmental Design program.	3.41	0.92	3.58	0.94	0.17
You believe the Environmental Design program is important to your career development.	3.45	0.96	3.56	0.93	0.12
You will consider a career related to environmental design after graduation.	3.35	0.97	3.46	0.95	0.10

You think it is important to include courses in your current program that improve your work skills and job competitiveness.	3.69	0.94	3.77	0.90	0.08

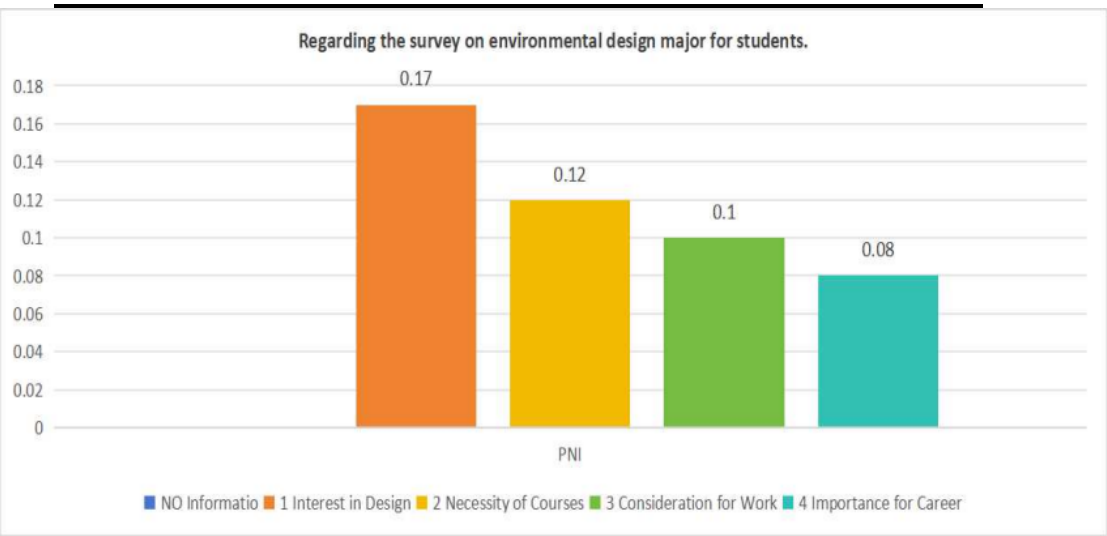

Figure 18 Histogram of students' attitudes toward the environmental design program

Source: Zhao Yajun

Based on the questionnaire data provided, the analysis shows that students show a certain degree of interest in and recognition of the environmental design major, as well as an awareness of the importance of the major to their future career development. By calculating the Priority Needs Index (PNI), the following are the results of calculating and analysing the PNI value for each item: interest in the environmental design major, with a PNI value of 0.17, indicating that students have a high interest in the major itself, but there is still room for improvement; the importance of the environmental design major to career development, with a PNI value of 0.12, showing that students believe that the major has a certain degree of importance to career development, with a The demand for improvement is relatively small; the willingness to engage in jobs related to environmental design after graduation, with a PNI value of 0.10, shows that students have some interest in engaging in related jobs after

graduation, but the demand for improvement is not large; the importance of adding courses to the curriculum to improve work ability and competitiveness for employment, with a PNI value of 0.08, shows that students consider such courses to be very important, and the demand for improvement is relatively large.

Overall, these findings indicate that students generally hold positive attitudes toward the environmental design program, acknowledge its role in career development, and express some intention to work in the field after graduation. However, they particularly emphasized the need to align the curriculum more closely with real-world job requirements to improve their employability. Educators should take this feedback into consideration when optimizing the program's design, strengthening both practical and theoretical instruction related to industry needs. Doing so will help better meet students' learning expectations and enhance their professional satisfaction and career preparedness.

Table 22 Students' attitudes toward the current state of teaching and learning in the program

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
You are more satisfied with the content and arrangement of teaching in the Environmental Design program.	3.44	0.93	3.56	0.89	0.11
You are often involved in the course of study related to the development of the industry.	3.4	0.92	3.49	0.9	0.1
You think the current curriculum of the environmental design major is difficult.	3.39	0.91	3.46	0.9	0.06
You think the assessment methods of the environmental design professional course are reasonable.	3.49	0.91	3.55	0.86	0.06

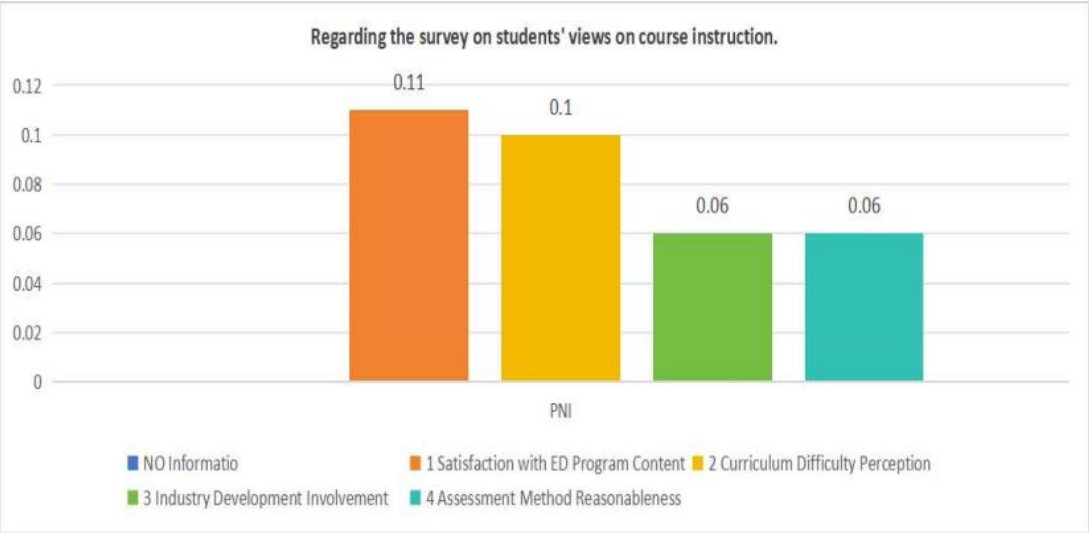

Figure 19 Histogram of students' attitudes toward the current state of teaching and learning in the course

Source: Zhao Yajun

Based on the results in Table 22 and Figure 19, students provided comprehensive feedback regarding their satisfaction with the teaching in the Environmental Design program and their expectations for improvement. Among these responses, the highest priority need was associated with the content and organization of instruction (PNI = 0.11), indicating that students perceive curriculum relevance and structural arrangement as the most critical areas for enhancement. They expressed a strong desire for course content to better align with real-world applications, thereby increasing instructional practicality and effectiveness, and facilitating the transfer of acquired knowledge to future professional contexts.This was followed closely by the need for courses to incorporate current industry trends and developments (PNI = 0.10). Students emphasized the importance of staying updated with latest field dynamics to better prepare them for the evolving demands of the workplace and strengthen their career competitiveness. Additionally, the appropriateness of assessment methods received noticeable attention (PNI = 0.06). While generally accepting of current evaluation approaches, students suggested that assessments could be made more

comprehensive and equitable to accurately reflect their learning progress and capabilities.Course difficulty was also identified as an area needing refinement (PNI = 0.06). Although most students considered the current difficulty level acceptable, they expressed a preference for better calibration to match their learning aptitudes—ensuring that courses are neither overly simplistic nor excessively challenging, thus optimizing learning outcomes.

Overall, these findings offer valuable insights for educators to refine teaching strategies, align curricular design with student expectations, and enhance the overall effectiveness and relevance of the Environmental Design program.

Table 23 Students' knowledge of professional development in environmental design

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
You are knowledgeable about the environmental design industry.	3.34	0.85	3.45	0.85	0.11
You think the development trend of the environmental design industry is favorable.	3.17	0.98	3.27	0.96	0.10
You think that working as an environmental design designer requires professional adaptability and creative and entrepreneurial practical ability.	3.67	0.91	3.71	0.88	0.04
You pay attention to the latest technology and tools in the environmental design industry.	3.48	0.89	3.52	0.9	0.04

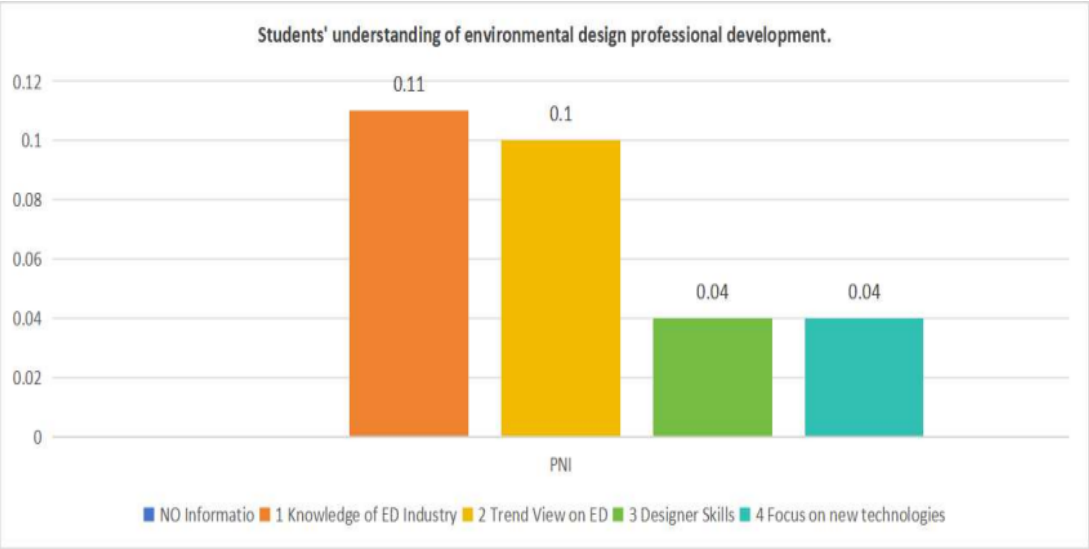

Figure 20 Histogram of Students' Knowledge of Professional Development in Environmental Design

Source: Zhao Yajun

According to the results of the questionnaire survey in Table 23 and Figure 20, the first concern is the issue of students‘ understanding of the environmental design industry, which has a mean value of 3.34 for satisfaction, a degree of need of 3.45, and a PNI value of 0.11, the highest of all the issues, revealing that there is an urgent need for students’ understanding of the industry. Next, the question of students‘ awareness of environmental design industry trends had a mean satisfaction value of 3.17, a demand level of 3.27, and a PNI value of 0.10, revealing a need for improvement in students’ awareness of industry trends. Further, the question of students' satisfaction with focusing on the latest technology and tools in the industry, with a mean satisfaction value of 3.48, a demand degree of 3.52, and a PNI value of 0.04, with lower scores, reveals that students are closer to the satisfaction and demand degree in this area, with a relatively low need for improvement. Finally, students‘ PNI value of 0.04 for career adaptability is the lowest, but satisfaction (mean 3.67) and demand (3.71) are the highest, indicating that students attach great importance to these competencies, and the PNI value may be relatively low, highlighting the importance of these competencies;

analysed from the point of view of satisfaction and demand, the issue of awareness of the importance of students' career adaptability and innovation and entrepreneurship competencies The satisfaction and demand degrees are the highest, reflecting students' clear understanding of the importance of these abilities for future career development and their strong demand for cultivation.

Secondly, the question of students' satisfaction with focusing on the latest technology and tools in the industry has a high and close satisfaction and demand, which shows the importance of this aspect to students, but the need for improvement is relatively low. Again, the question of students‘ awareness of the development trend of the environmental design industry, with a medium level of satisfaction and demand, shows that there is a gap in students' awareness in this area and room for improvement. Finally, the question of students' understanding of the environmental design industry has a relatively low level of satisfaction and demand and the highest PNI value, indicating that students have the most urgent need to increase their understanding of the industry.

Table 24 Students' Attitudes and Expectations Toward the Simulated Company Course

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
You are interested in the Environmental Design program conducting a simulated company course.	3.55	0.88	3.64	0.91	0.08
You would like to have the SC course co-taught by industry experts from outside the university.	3.69	0.92	3.77	0.91	0.08
You are willing to participate in the SC course if it is conducted.	3.64	0.94	3.68	0.91	0.04
You believe that the SC course will improve your professional competence.	3.68	0.93	3.71	0.91	0.04

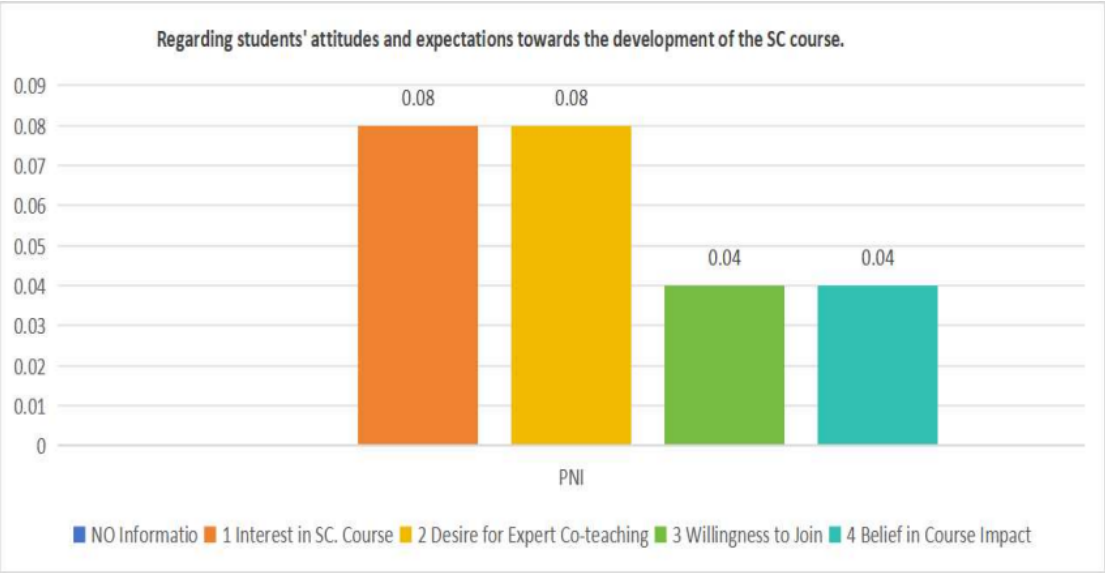

Figure 21 Histogram of Students' Attitudes and Expectations towards Course Development in Simulation Companies

Source: Zhao Yajun

According to the results of the questionnaire in Table 24 and Figure 21, students' attitudes and expectations towards the simulated company course show a clear tendency. By analysing the PNI values, we can determine the most pressing needs of students. The highest PNI value of 0.08 is for joint lectures by external industry experts, which indicates that students attach extreme importance to the participation of industry experts and believe that this will greatly enhance the practicality and relevance of the course. This is followed by students' interest in simulated company courses, with a PNI value of 0.09, indicating that students generally believe that such courses provide a learning experience that cannot be matched by traditional teaching. The PNI value of 0.04 for simulated company courses that enhance professional competence indicates that students also look forward to enhancing their professional skills through practice. Finally, the lowest PNI value of 0.04 for willingness to participate in the simulated company course indicates that students' satisfaction and demand for participation in the course are more consistent with a relatively low need for improvement. In terms of the

dimensions of satisfaction and demand, students had the highest satisfaction (mean value 3.69) and the highest demand (mean value 3.77) for co-taught courses with external industry experts, indicating that students highly valued the participation of industry experts. Students'

interest in the simulated company course has a satisfaction level of 3.55 and a demand level of 3.64, reflecting their positive attitude towards this innovative teaching mode. In terms of enhancing professional competence, the satisfaction level is 3.68 and the degree of demand is 3.71, indicating that students have a strong expectation of enhancing their professional skills through the simulated company course. The satisfaction and demand for willingness to participate were 3.64 and 3.68 respectively, indicating that students were open and motivated to participate in the simulated company course. These findings collectively emphasize students' support for industry-integrated and practice-oriented teaching methods, providing valuable guidance for further refining the simulated company course to better align with learner expectations and professional demands.

Table 25 Students' ability to adapt to the needs of the company's jobs and related to training

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
You are good at summarizing and evaluating the end phase of a project.	3.38	0.89	3.51	0.87	0.13
You can handle well in project risk identification and response.	3.37	0.89	3.49	0.87	0.11
You believe that you are quicker to adapt and perform in a new work environment.	3.52	0.89	3.61	0.9	0.1
You believe you have a higher potential for career advancement in your area of specialization.	3.44	0.9	3.54	0.88	0.1
You feel that your ability to identify market opportunities and translate them into business proposals is good.	3.33	0.87	3.44	0.86	0.1
You feel that you have a good ability to adapt and solve problems in practice.	3.36	0.88	3.46	0.86	0.1

You consider yourself to be good at coordinating resources and assigning tasks in team projects.	3.41	0.85	3.5	0.87	0.09
You believe you have a higher ability to learn new skills quickly in different work environments.	3.49	0.84	3.56	0.85	0.08
You believe that your professional knowledge and skills meet the needs of the current job market.	3.28	0.95	3.36	0.91	0.08
You are good at creating and adhering to project timelines and managing project budgets.	3.43	0.85	3.5	0.87	0.07
How competent do you consider yourself, in terms of developing and adhering to project timelines and managing project budgets?	3.44	0.85	3.51	0.85	0.06
You usually act as a creative provider in team projects and are able to drive innovative ideas forward.	3.41	0.87	3.47	0.85	0.06
You consider yourself strong in applying theoretical knowledge to solve practical problems.	3.39	0.85	3.45	0.88	0.05
You feel that you do a better job of understanding the perspectives and needs of others.	3.53	0.85	3.55	0.87	0.03
Do you have the ability to appropriately handle disagreements or conflicts within your team?	3.47	0.83	3.49	0.87	0.02

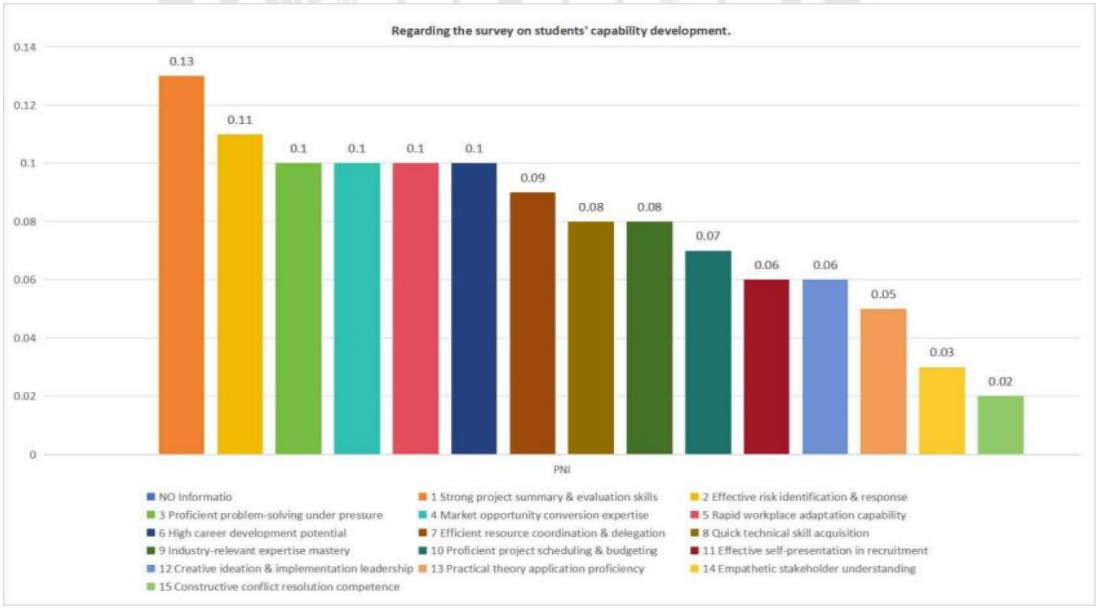

Figure 22 Histogram of students' opinions on the adaptation to the needs of the company's jobs and the related competencies to be cultivated

Source: Zhao Yajun

Analysing students' satisfaction and demand for each item of the dimension of the relevant competencies to adapt to the needs and cultivation of corporate jobs, according to the findings in Table 25 and Figure 22, students show different levels of satisfaction and demand for the relevant competencies to adapt to the needs and cultivation of corporate jobs. By analysing the Priority Needs Index (PNI), we found that the competence that students most urgently need to improve is 'the ability to find themselves identifying market opportunities and transforming them into business proposals' (PNI=0.10), followed by 'the potential for career development in their professional fields' (PNI=0.10), and 'the potential for career development in their professional fields' (PNI=0.10). ' (PNI=0.10), followed by 'Potential for career advancement in the professional field' (PNI=0.10) and 'Speed of adaptation and effectiveness in a new work environment' (PNI=0.10). In addition, the ability to 'can handle better in project risk identification and response' also showed a high level of demand (PNI=0.11). These results suggest that students want to improve their market insights, awareness of career potential, and ability to adapt to new environments, while also placing a high value on risk management skills. In terms of satisfaction and demand, students had the highest level of satisfaction (mean 3.47) but relatively low demand (mean 3.49) for the statement 'When there is disagreement or conflict within a team, you can handle it appropriately to avoid conflict', with a PNI of 0.02, which suggests that students generally believe they do a good job of dealing with conflict in their teams, and that improvement is needed. conflict well, with a relatively low need for improvement. On the other hand, 'You think your professional knowledge and skills meet the current needs of the job market' has the lowest level of satisfaction (mean 3.28) and a relatively high level of demand (mean 3.36), with a PNI value of 0.08, which indicates that students have a low level of satisfaction with their professional knowledge and skills, but a high level of demand for improving these competencies.

Overall, the results highlight a clear focus among students on developing forward-looking, adaptive, and market-relevant skills, providing important insights for

curriculum enhancements aimed at closing the gap between academic training and corporate expectations.

Table 26 Survey of Students' Expectations for Improved Instructional Effectiveness of the Simulated Company Class Setting.

Informatio	Satisfaction		Needs		PNI
	M	SD	M	SD	
Your experience would be better if the SC course had a teamwork component.	3.62	0.84	3.71	0.86	0.09
The course will be more effective if its content matches well with the employment needs of the environmental design program.	3.61	0.88	3.69	0.87	0.08
It would have been more helpful if the instructor had designed the teaching methodology of the course to be effective.	3.61	0.84	3.69	0.85	0.08
You believe that the SC course would enhance your knowledge and understanding of the environmental design industry.	3.62	0.85	3.69	0.84	0.06
You would be more satisfied if the course was well organized and timed.	3.65	0.87	3.7	0.87	0.06
The teaching effect will be better if the resources of the course, such as guidance from industry experts and seminars, are added.	3.66	0.86	3.69	0.89	0.03
You would be more satisfied if the instructor provided timely and effective feedback and guidance to students.	3.69	0.85	3.72	0.85	0.03

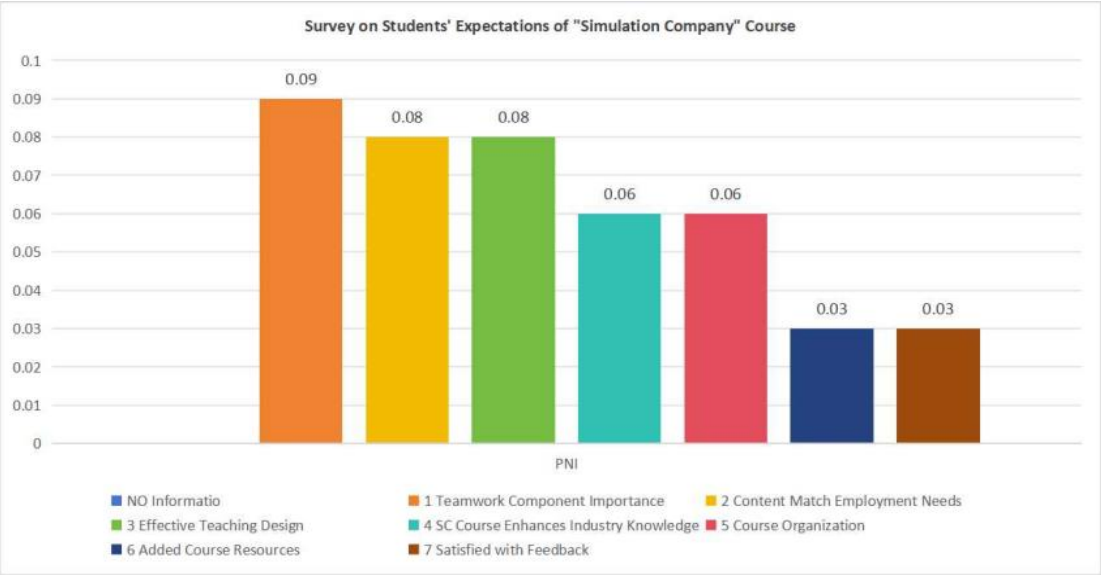

Figure 23 Histogram of the survey of students' expectations regarding the enhancement of teaching effectiveness of the simulated company class setting

Source: Zhao Yajun

According to the findings in Table 26 and Figure 23, students hold clear expectations for improving the pedagogical effectiveness of the simulated company course curriculum. By analysing the Priority Needs Index (PNI), we found that the aspect that students most expected to be improved was the teamwork aspect of the course curriculum, which had a PNI value of 0.09, indicating that students valued the teamwork experience and saw it as the key to enhancing their course experience and learning satisfaction. This was closely followed by the extent to which the course content matched the employment needs of the environmental design profession (PNI = 0.08) and the effectiveness of the instructor's design in the course teaching methods (PNI = 0.08), both of which indicated that students wanted the course content to be closely aligned with the actual needs of the job market and the teaching methods to be able to effectively support their learning process. In terms of satisfaction and demand, the highest satisfaction (mean 3.62) and demand (mean 3.71) for the teamwork component of the Mock Company course further confirms the high value that students place on the

teamwork component. Satisfaction with the timeliness and effectiveness of teachers‘ feedback and guidance to students was 3.69 and the degree of demand was 3.72, with a PNI value of 0.03, which suggests that students have a high demand for teachers’ feedback and guidance and expect teachers to provide more effective guidance. The satisfaction level of matching course content with employment needs is 3.61, the degree of demand is 3.69, and the PNI value is 0.08, which indicates that students want the course content to be more practical and closer to their future career needs. The satisfaction level of teaching progress and time schedule is 3.65, the degree of demand is 3.70, and the PNI value is 0.06, which shows that students have certain expectations for the time management of the course, and hope that the teaching progress and time schedule can be more reasonable.

These findings collectively emphasize the importance of enhancing collaborative learning, strengthening the connection between curriculum and industry demands, optimizing instructional support, and improving time allocation in order to meet students’ expectations and increase the overall effectiveness of the simulated company course.

Table 27 Students' specific visions for the development of the "SC" course

Informatio	M	SD
Would you consider it better to offer a simulated company course program that includes a real interaction component with customers?	3.9	0.87
You would find the "Simulated Company" program very useful for your career adaptability and employability.	3.9	0.86
You would be more satisfied if the Simulated Company program included real interaction with clients.	3.88	0.87
If you were to take the "Simulated Company" course, you would recommend it to other students.	3.88	0.88
You would be more satisfied if the Simulated Company syllabus was designed to mimic the flow of a real business project.	3.87	0.84
Do you think the SC program will improve your career adaptability, employ ability, innovation and entrepreneurship, and practical skills?	3.87	0.87

You would be willing to participate in the "Simulated Company" program if it helped you to improve your work ability.	3.86	0.89
You believe that the "Simulated Company" program has helped to increase your self-confidence and self-efficacy in your work.	3.85	0.86
You would be more satisfied if the Simulated Company program used real design case studies.	3.82	0.85
You would be more satisfied if the Simulated Company course was taught in grades 3-4.	3.76	0.86

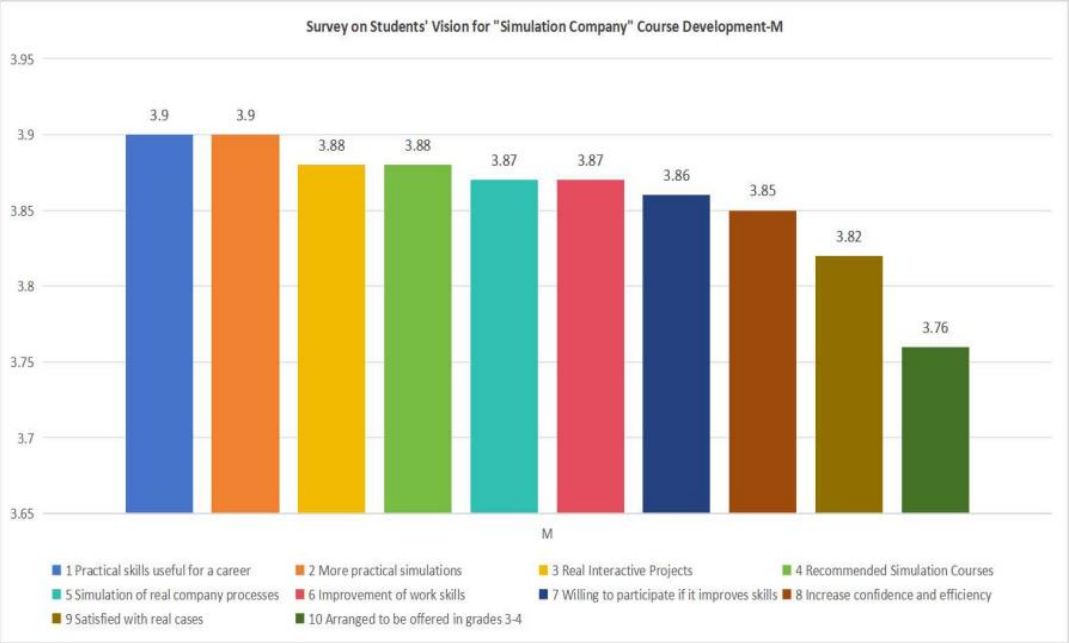

Figure 24 Students' expectations of teaching in simulated companies-mean

Source: Zhao Yajun

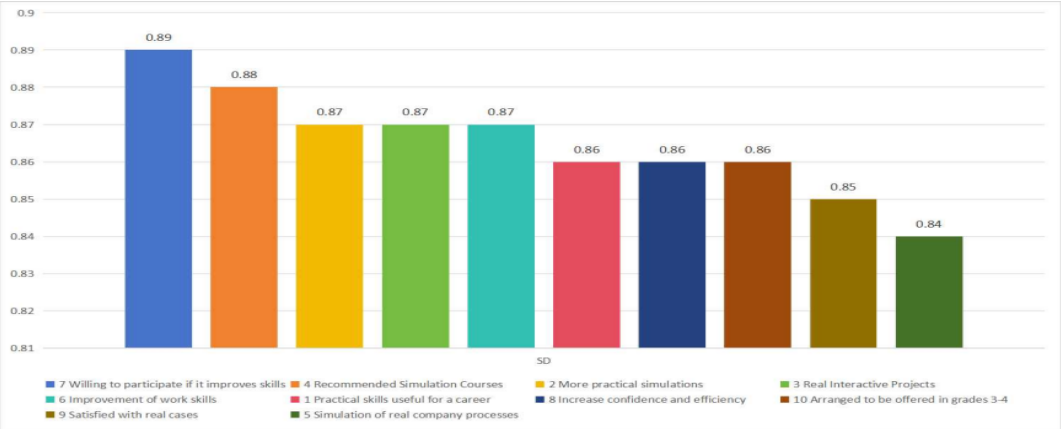

Figure 25 Students' expectations of teaching in simulated companies-SD

Source: Zhao Yajun

Based on the results of the questionnaire survey (N=10 questions) on students' visions for the development of the “Simulation Company” course, the analysis of the mean (M) and standard deviation (SD) revealed that the core demands of the students were focused on the practical orientation of the course and the enhancement of career value. Specifically, students' core demands were related to “practical activities, field trips and simulation projects” (M=3.90), “practicality of career adaptability and employability” (M=3.90), and “real interaction with clients” (M=3.90). ‘ (M=3.88) had the highest scores, indicating that practicality and career relevance were key drivers in course design; meanwhile, ‘course design that mimics real business processes’ (M=3.87) and ‘general competency enhancement ‘ (M=3.87) high approval ratings corroborate the effectiveness of the course structure. In addition, students generally had a high willingness to recommend the course (M=3.88), and the low standard deviation (0.84 to 0.89) indicates that most students were relatively consistent in their views on these issues, which provided a clear direction for course design.

However, some variability was observed in perceptions of the course’s contribution to job competence (SD=0.89) and willingness to recommend it to peers (SD=0.88), reflecting diversity in student backgrounds, experiences, and expectations regarding course content and teaching methods. These variations highlight the need for

a more flexible and inclusive curriculum design that can accommodate differing learning preferences and career goals.

Overall, the results provide clear guidance for enhancing the practical and employment-oriented dimensions of the Simulation Company course, while also suggesting that further differentiation in instructional approaches may help address divergent student needs.

1.1.4 Summary of the results of the questionnaire survey

Based on the analysis of the questionnaire survey among environmental design students, several key issues have been identified: students lack sufficient understanding of industry development trends. While they place high importance on professional skills and creative practical skills, their awareness of broader industry dynamics and market insights remains limited, indicating that the current curriculum may be inadequate in covering industrial trends and market demand analysis. Furthermore, students generally reported a shortage of internship experience and emphasized the need to improve their practical abilities, suggesting that the practical aspects of the curriculum need strengthening to better prepare them for real-world work environments. Although students generally regard the course content positively, they expect greater alignment with actual job requirements, particularly in enhancing the practical relevance of courses, highlighting a disconnect between instructional content and industry needs.

To address these issues, the following improvements are recommended: enhance course content related to industry trends, market analysis, and cutting-edge technologies through lectures by industry experts and collaborative courses with enterprises; strengthen university-industry cooperation by incorporating real projects and innovative teaching approaches such as "simulated companies" to provide students with practical experience close to real work scenarios; promote internship programs and encourage participation in corporate internships during academic studies. Additionally, more authentic industry cases should be introduced into the curriculum, with professionals invited to participate in course design to ensure alignment with industry

needs. Project-based learning should be adopted to allow students to directly engage with industry demands.

Finally, career planning courses and vocational skills training—such as interview techniques, resume writing, and personal branding—should be offered. A career mentorship system involving industry professionals and alumni can provide further guidance. Teamwork skills should be strengthened through projects and workshops, with specialized training in team management and cross-disciplinary collaboration to improve students' communication and leadership skills. Encouraging participation in interdisciplinary collaborative projects will also help foster teamwork and holistic competence. These measures aim to bridge the gap between academic training and industry expectations, thereby enhancing students' professional readiness and employability.

1.2 Interview results

In order to gather first-hand information, this study employed semi-structured interviews as a key methodological approach. The interviews were carefully designed to encourage participants to share their insights and experiences while allowing sufficient flexibility to explore relevant topics in greater depth. For the purposes of this research, interviewees were categorized into three distinct groups. The first group consisted of representatives from design firms, including managers from design studios in Xinxiang City, Henan Province, as well as established designers with extensive experience in the field. The second group included representatives from higher education institutions, comprising administrators, specialists, and instructors involved in environmental design education. A total of 10 interviewees participated across these categories. The interviews were conducted based on a predefined protocol, which provided a consistent framework while enabling interviewers to adapt and probe more deeply based on participants' responses. The list of interviewees is presented in Table 28, and the full interview protocol is included in the appendix.

Table 28 Expert interviews - list of participant

No	name	Workplace	Position	Category
1	Zheng Guoli	Henan Erdong Architectural Decoration Design Institute	CEO	Design company managers
2	Liu Jinfeng	Henan Yonghe Architectural Decoration Engineering	CEO	
3	Yi Peng	Henan Le Jiao Design & Engineering Co.	CEO	
4	Zhou Ting	Henan Yonghe Architectural Decoration Engineering	design director	Famous designers
5	Wang Chunguang	Henan Zhuo Cheng Architectural Decoration Design Institute	design director	
6	Guao Yuan	Henan Youhua Architectural Decoration Design Co.	design director	
7	Zheng Shihua	Henan Institute of Science and Technology Environmental Design Program	Dean, Professor	Experts and teachers of environmental design teaching
8	Wang Dong	Environmental Design Program, Henan Institute of Technology	vice-president (of a university etc)	
9	Shen yingying	Henan Normal University Environmental Design Program	Head of Specialty	
10	Li Man	Xinxiang College Environmental Design Program	Associate Professor	

The research process strictly followed the three-level coding procedure of rooted theory. Firstly, the raw interview data were conceptualised through open coding; secondly, the principal axis coding method was applied to summarise relevant concepts into main categories through comparative analysis and relationship sorting between categories; and finally, the core categories were identified through selective coding to construct the theoretical framework. The study uses NVivo 12 qualitative analysis software to assist data processing, and ensures the reliability and validity of the research results through continuous comparison and verification.

1.2.1 Open coding

Open coding was the first step in this study, aiming to provide an initial understanding of the data collected through in-depth interviews. We transformed descriptions, opinions, and feedback from the interview texts into conceptual labels to

form free nodes (or primary concepts). The goal of this study was to collect a variety of data fragments related to the pedagogical model of a simulation-based company specialising in environmental design to provide a basis for subsequent spindle coding and selective coding.

By analysing respondents' interview texts in detail, we used NVivo software to perform basic node delineation and coding of the texts in order to gain a deeper understanding of the data. We co-analysed a large number of text snippets, labelling statements that dealt with pedagogical reforms in environmental design, simulated company operations, and the talent development model to generate multiple initial concepts. To ensure the generality and validity of these labels, we excluded labels that were mentioned only once and removed labels that were not relevant to the research topic. Subsequently, we merged similar labels, resulting in a series of representative categories.

Table 29 Category extraction

Initial scope	Original Interview Statement
Downward pressure on the economy	'In the current market environment, we observe a not very optimistic picture, especially as the downward pressure on the economy gradually increases' (Liu Jinfeng)
Reduced number of projects	'Many projects had to be postponed or even cancelled' (Liu Jinfeng)
Increased cost control	'Our company has to pay more attention to cost control while ensuring the quality of our projects' (Liu Jinfeng)
Demand for sustainable design	'Especially the two directions of sustainable design and smart space design have huge growth potential' (Zheng Guoli)
Rise of smart space design	'In the future, green, smart home and efficient office space design will definitely become mainstream' (Zheng Guoli)
Remodelling market for old houses	'Designers in the future can no longer rely on traditional models and need to expand their service areas, such as renovation of old houses and sustainable design' (Wang Chunguang)
Popularity of AI-assisted design	'Although AI technology may replace some basic design work to a certain extent in the future, such as the automatic generation of drawings and plans' (Ting Zhou)

Intelligent Construction Development	'Enterprises have commonly applied recycled building materials and intelligent construction systems' (Li Man)
Accelerated digital transformation	'Even cross-border digital space design' (Wang Chunguang)
Unskilled software operation	'Typically, fresh graduates possess a theoretical knowledge base, however, they often lack sufficient practical experience in actual operation and project management... They are not skilled enough in using various design software' (Zheng Guoli)
Unstandardised construction drawings	'They can draw beautiful renderings, but they don't know how to avoid the problem of load-bearing walls during construction' (Wang Chunguang)
Lack of material application	'They don't even know the basic material quotation' (Yin Peng)
Weak budget control	'They can talk about design concepts, but they don't know the cost of the construction team' (Wang Chunguang)
Poor communication skills	'There is still a lot of room for improvement in their problem-solving skills when communicating effectively with clients and when facing real problems' (Zheng Guoli)
Weak anti-pressure ability	'Students also need to develop a strong heart and not be overly sensitive or fragile, or as we often say, 'don't be glassy-eyed'' (Liu Jinfeng)
Low team spirit	'Their grasp of the whole process of project management is also not comprehensive enough' (Zheng Guoli)
Low project experience	'71.04% of students lack professional internship experience in environmental design' (Questionnaire data)
Difficulty in problem solving	'In actual design projects, how to flexibly apply this knowledge and make innovative designs in combination with the actual situation still needs more practice and exercise' (Zheng Guoli)
Combination of theory and practice	'Bringing businesses into the classroom! When I was working in New York, the college directly invited the director of the design company to bring real projects to class' (Guo Yuan)
Step-by-step progression	'The first and second years of college are all about the fundamentals: structural mechanics, materials science, and design specifications, which are the basis of our foundation; the third and fourth years of college are all about the real thing.' (Wang Chunguang)
Interdisciplinary integration	'Students team up to bid for the project, and the winning proposal will really be adopted' (Guo Yuan)
Process assessment	'Through the 'three-dimensional diamond assessment method' - student self-assessment (20%), expert overview (50%), public voting (30%)' (Shen Yingying)
Enterprise Participation Assessment	'Enterprises score from commercialisation dimension, teachers review academic normality' (Wang Dong)

In-depth cooperation between schools and enterprises	'Schools and companies can strengthen cooperation and work together to optimise curriculum design' (Zheng Guoli)
Functional Division of Departments	'Create some really corporate positions (e.g. project manager, chief designer, budgeter who counts the money, and a specialist who deals with clients)' (Li Man)
Workflow specification	'Take the design company's most common project process as an example (first understand the demand ⟶ then design a programme ⟶ then in-depth refinement ⟶ then coordinate the construction ⟶ finally collect operational feedback)' (Li Man)
Project operation process	'Design course modules according to the five phases of enterprise projects (demand analysis ⟶ scheme design ⟶ deepening design ⟶ construction coordination ⟶ operation feedback)' (Shen Yingying)
Performance Assessment System	'Introducing 'black box events' (such as Party A's temporary replacement of the main designer), requiring the submission of a response plan within 48 hours' (Shen Yingying)
Real project docking	'Directly docking with small and micro enterprises to do free design (such as community transformation), students are involved in the whole process from room measurement to landing' (Wang Chunguang)
Design innovation ability	'Innovation is also necessary, you have to be able to come up with design solutions that are both innovative and popular' (Zheng Guoli)
Professional software operation ability	'You have to be technically sound, for example, you have to be able to use CAD and SK, which are essential tools for design' (Zheng Guoli)
Project management ability	'You have to be able to organise time and allocate resources to ensure that the project is completed on time.' (Zheng Guoli)
Communication and Coordination Ability	'Strong communication skills, you have to know how to communicate with the client and the team to make sure the information is conveyed accurately' (Gary Cheng)
Market insight	'Not being able to translate design language into business value' (Yingying Shen)
Business Thinking Cultivation	'What companies need are not 'designers' but 'problem solvers'' (Wang Chunguang)
Entrepreneurial Practice Ability	'Designers are likely to become freelancers or studio managers in the future.' (Guo Yuan)

1.2.3 Spindle coding

In this study, the open coding phase generated a series of initial concepts that addressed multiple aspects of the teaching model of the simulation company specialising in environmental design. Despite the theoretical value of these concepts,

they remained isolated and lacked interconnections. In order to gain a deeper understanding of the connections between these concepts, work was conducted on spindle coding.

Spindle coding, as the second phase of the study, was based on open coding to further organise and categorise the data in order to identify the core themes and key concepts of the study. The principal axis coding helped to integrate the large number of open codes into more organised information in order to better understand the intrinsic connections between the data of the research on teaching and learning reforms in environmental design.

In this study, the goal of principal axis coding was to integrate the information from the open coding into major categories in order to analyse and discuss the constructed dimensions of the teaching model of the simulation company in greater depth. Through principal axis coding, we were able to integrate the scattered information into a clearer and more organised structure to better understand the multiple dimensions of the pedagogical reform of the environmental design profession and its implementation pathway.

Table 30 Scope summarisation

Core category		Main category	Initial category
Industry Situation	Development	Market Status	Downward pressure on the economy
			Reduced number of projects
			Strengthened cost control
			Increased competition
		Development Opportunities	Demand for sustainable design
			Rise of smart space design
			Remodelling market for older homes
			Growth of customised services
		Technological Changes	Popularity of AI-assisted design
			Intelligent construction development
			Accelerated digital transformation
			Expansion of new material application
Talent Capacity Gap		Insufficient professional skills	Unskilled operation of software

		Construction drawings are not standardised
		Lack of material application
		Weak budget control
	Lack of professionalism	Poor communication skills
		Weak anti-pressure ability
		Weak team spirit
		Poor sense of responsibility
	Lack of practical experience	Low project experience
		Weak construction management
		Difficulty in problem solving
		Poor site coordination
Education Model Innovation	Reconstruction of Curriculum System	Combination of theory and practice
		Step-by-step progression
		Interdisciplinary Integration
		Project-based Teaching
	Innovation of Assessment Mechanism	Process Assessment
		Multi-dimensional Evaluation
		Practical Result Orientation
		Enterprise Participation Evaluation
	Optimisation of resource integration	In-depth co-operation between schools and enterprises
		Diversity of Tutors
		Practice Base Construction
		Project Resource Sharing
Simulation company construction	Organisational structure design	Division of departmental functions
		Job Role Setting
		Workflow specification
		Management system establishment
	Establishment of operation mechanism	Project operation process
		Performance appraisal system
		Reward and punishment system development
		Resource allocation programme
	Arrangement of Practical Sessions	Real project docking
		Enterprise mentor guidance
		Market Research Practice
		Programme Reporting and Presentation

Cultivation Target Positioning	Professional Competence Enhancement	Design innovation ability
		Technical application ability
		Project management ability
		Cost control ability
	Vocational Literacy Cultivation	Communication and coordination ability
		Teamwork Awareness
		Problem solving ability
		Resistance and adaptability
	Innovation and Entrepreneurship Guidance	Market insight
		Business Thinking Cultivation
		Entrepreneurial Practical Ability
		Risk Management Awareness

1.2.4 Selective coding

In this study, the process of selective coding involved integrating the main categories summarised in the spindle coding: the teaching model of the environmental design profession based on the simulation company, into a comprehensive theoretical framework that would allow for an in-depth understanding of the impacts of the reform of the teaching and learning of the environmental design profession and its interactions. At the same time, the central aim in undertaking selective coding was to construct a theoretical framework through which the interactions between the core category, the construction and implementation of the teaching model in the simulation company, and the other categories could be understood.

Table 31 Typical relational structure of main categories

Relational Structure	Structural Connotation
Industry Development Trend ⟶ Talent Cultivation Demand	Trends in the environmental design industry (e.g. digital transformation, sustainable design) directly influence the direction and requirements of talent training.
Talent ability gap ⟶ Education mode innovation	The gap between existing graduates' ability and enterprises' demand pushes the reform and innovation of education mode.

Innovation of Education Mode → Construction of Simulation Company	The demand for innovation in the education model has led to the establishment and improvement of the teaching model of the simulation company.
Simulated Company Construction → Cultivation Goal Realisation	The organisational structure and operation mechanism of the simulation company directly serves the achievement of professional talent training objectives.
Positioning of Cultivation Objectives → Optimisation of Curriculum System	Clear training objectives lead to the continuous optimisation and improvement of the curriculum system.
Arrangement of Practical Sessions → Enhancement of Vocational Ability	Real project practice and guidance from enterprise mentors promote the comprehensive improvement of students' vocational ability.
Innovation of Assessment Mechanism → Teaching Quality Assurance	Diversified assessment mechanism ensures the quality of teaching and training effect.
Integration and optimisation of resources → enhancement of teaching effect	In-depth university-enterprise co-operation and resource sharing enhance the overall teaching effect.

1.2.5 Theory Saturation Validation

At the initial stage of the study, the research systematically collected a large amount of initial data on the teaching reform of the environmental design profession and its influencing factors. Through open coding, we identified a series of initial concepts and categories covering a variety of dimensions ranging from industry development dynamics to talent competency gaps, and from education model innovation to simulation company construction. As the study progressed, we continued to collect data and iteratively test and validate these initial concepts and categories. To ensure the depth and breadth of the theory, the study continually reviewed and compared the data collected in the early and late stages to verify the stability and consistency of these concepts and categories. During this process, some of the initial concepts were further refined or merged to more accurately reflect the issues and their complexity in the reform of teaching and learning in environmental design. Theoretical saturation was considered to have been reached when successively collected data began to repeat itself and no longer provided new insights into existing theoretical frameworks.

1.2.6 Theoretical construction

Based on the analysing process of rooted theory, this study constructs a theoretical framework of the teaching mode of environmental design major based on simulation company. The theoretical framework reveals the intrinsic mechanism and key influencing factors of the teaching reform of the environmental design profession, forming a dynamic system with multi-dimensional interaction.

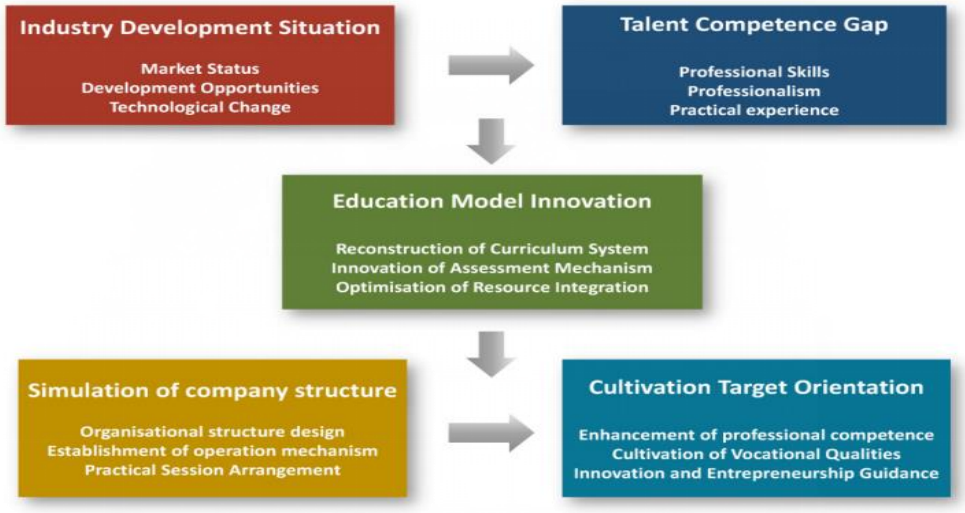

Figure 26 A theoretical framework for a basic pedagogical model for simulation companies in environmental design.

Source: Zhao Yajun

In the dimension of industry development situation, the study found that the current environmental design industry is in a critical period of transformation and upgrading. The current market situation shows obvious structural adjustment characteristics, economic downward pressure and intensified competition in the industry to form a double squeeze, prompting enterprises to have to seek a balance between cost control and innovation and development. At the same time, new development opportunities are emerging, the rise of sustainable design, intelligent space design and

other emerging areas for the industry to inject new growth momentum. It is worth noting that technological changes are reshaping the industry ecosystem, the popularity of AI-assisted design and the acceleration of digital transformation not only change the traditional design methods and workflow, but also more deeply affect the role of designers and ability requirements. This industry development is directly mapped to the field of talent training, requiring educational institutions to make fundamental changes to the talent training model. The in-depth analysis of the talent ability gap reveals a significant break between the current environmental design professional education and industry demand. The lack of professional skills is manifested in technical aspects such as unskilled software operation and irregular construction drawings, but the deeper reason lies in the insufficient understanding of design principles and engineering practices. The lack of professionalism reflects a more fundamental problem of educational philosophy, as the traditional mode of knowledge transfer makes it difficult to cultivate students' communication skills, stress resistance and teamwork awareness. The lack of practical experience is not only manifested in the lack of project experience, but also in the lack of problem solving ability and on-site coordination ability. The formation of this competence gap is systematic and cumulative in nature, and needs to be bridged through the overall innovation of the education model.

The innovation of education model constitutes the core strategic framework to deal with the above challenges. The reconstruction of the curriculum system is not a simple adjustment of the curriculum, but a comprehensive reorganisation and integration of the knowledge system. Through the combination of theory and reality and the gradual progression of steps, a curriculum structure that meets the cognitive law and the needs of ability progression has been constructed. The innovation of assessment mechanism breaks the traditional single assessment method, and establishes a three-dimensional assessment system including process assessment, multi-dimensional evaluation, and practical result orientation. The optimisation of resource integration focuses on the construction of educational ecology, and through the deep cooperation between schools and enterprises and the diversification of tutors,

the optimal allocation of educational resources and the maximisation of the efficiency of their use are realised.

Simulated company construction is the theoretical innovation core of this study, which is not only a form of teaching organisation, but also a systematic practice of educational innovation. The organisational structure design goes beyond simple role simulation, but builds a real professional operation system, including departmental function division, job role setting, workflow specification and other levels. The establishment of operation mechanism focuses on how to organically integrate the real project operation process and performance appraisal system into the teaching process. The arrangement of practical sessions emphasises the principle of 'authenticity', which makes the learning process closer to vocational practice by docking with real projects and introducing guidance from enterprise mentors. The orientation of training objectives is the guiding element of the whole theoretical framework. Professional ability enhancement is no longer limited to the traditional design skills training, but emphasises the cultivation of comprehensive professionalism, such as design innovation ability, technology application ability and project management ability. Cultivation of professional literacy highlights the key abilities to adapt to the needs of future career development, including communication and coordination ability, teamwork awareness and so on. Innovation and entrepreneurship guidance, on the other hand, reflects the cognition of diversification of future career development, and provides a broader space for students' career development by cultivating market insight, business thinking and other abilities.

There is a complex interaction between these 5 dimensions. The development trend of the industry drives the innovation of the education model through the emergence of talent capability gaps; the innovation of the education model is implemented through the construction of the simulated company; and the positioning of the cultivation objectives provides a clear direction guide for the whole system. This multi-dimensional interaction constitutes a dynamic and balanced system, where each element supports and promotes each other, and jointly promotes the quality improvement of environmental design professional education. The core value of the

simulation company teaching mode is that it realises the deep integration of the educational process and professional practice. This integration is not a simple form of imitation, but a systematic innovation in education concept, organisational form, operation mechanism and other levels. By implanting the real operation logic of enterprises into the education process, it creates a learning environment that not only maintains the essence of education but also fully reflects the characteristics of the profession. This environment can effectively activate students‘ learning motivation, cultivate their professional ability and vocational quality, and at the same time provide a new path for teachers’ professional development.

The theoretical framework constructed in this study goes beyond the traditional reform of teaching mode and provides a systematic solution. It not only answers the question of ‘what kind of people to cultivate’, but more importantly, it answers the question of ‘how to cultivate’. By organically integrating the industry development trend, talent ability demand, education mode innovation, simulation company construction and cultivation target orientation, it forms an education innovation model with both theoretical depth and practical guidance value. The implementation process of the simulation company teaching mode is itself a process of continuous optimisation and improvement. Through practice, it has been proved that this mode can effectively alleviate the problems existing in talent training, improve the quality of education and enhance the competitiveness of students' employment. At the same time, the implementation of this mode also promotes the professional development of the teaching team, promotes the deepening of school-enterprise cooperation, and provides a new power source for the sustainable development of environmental design professional education.

1.3 Comprehensive Assessment of the Current Situation in Environmental Design Education: Insights from Questionnaire and Interview Results

The purpose of this study is to analyse in depth the current situation and problems of the environmental design profession in Xinxiang, Henan Province, China, to develop an environmental design curriculum model suitable for universities in Xinxiang City to enhance students' abilities, and to improve the quality of education in universities

in Xinxiang, Henan Province, through the environmental design teaching model. Data collected through questionnaires and semi-structured interviews were systematically cross-analysed to reveal the deep-rooted problems and structural contradictions in the education system of environmental design majors.

The questionnaire survey shows that the current educational status of environmental design majors presents complex multidimensional characteristics. First of all, in terms of professional cognition and career development, the data reflected that there were significant differences in students' identification with the profession and confidence in career development. As high as 76.45% of students reflect the lack of practical experience, and 72.97% of students believe that professional skills are insufficient, and this general lack of competence reflects the structural imbalance between knowledge transfer and competence cultivation in the current education system. It is especially noteworthy that there is an obvious trend of geographical loss in terms of employment intention, only 2.32% of the students said that they would definitely stay and work in Xinxiang City, and 50.19% said that they might stay in Xinxiang City, and this tendency of talent exodus not only reflects the students' lack of confidence in the local employment market, but also reveals the problem of the suitability between the regional economic development and the cultivation of talents at a deeper level. Through in-depth analysis of the reasons why students chose to leave Xinxiang, it was found that salary level (71.24%) and career opportunities (70.08%) were the two main driving factors, which indicated that there was a significant gap between the development level of the local environmental design industry and the career expectations of graduates.

By analysing the PNI index of the questionnaire survey, the study identifies the key issues that need to be dealt with with the highest priority: students' attitudes towards the environmental design profession (PNI=0.11) ranked first, and this indicator reflects the fundamental issues of professional identity and career orientation. This is followed by the status of curriculum teaching (PNI=0.08) and the understanding of industry development (PNI=0.08), the juxtaposition of which highlights the problem of matching between education supply and market demand. In terms of specific

competency dimensions, the high PNI values for the ability to summarise and evaluate the end-of-project phase (PNI=0.13) and the ability to identify and respond to project risks (PNI=0.11) reveal a significant deficit in students' high-level competencies such as project management and risk control. This imbalance in the competency structure reflects that the current education system focuses too much on basic knowledge transfer and neglects the cultivation of high-level vocational competencies. Based on the analysis of the PNI results of the questionnaire, the current teaching status of environmental design majors and students' competency development needs can be summarised into several key points. Firstly, the correlation between students' interest in the environmental design major and their career development is high (PNI: 0.17, 0.12), but there is still room for improvement in terms of industry awareness, market sensitivity, and preparation for career development (PNI: 0.10-0.11). In addition, although students performed better in project management, risk response and problem solving skills (PNI: 0.10-0.13), their satisfaction with the content and arrangement of teaching was moderate (PNI: 0.11), indicating that there is still potential to optimise the course content and teaching model in terms of relevance and innovation.

Therefore, in the future development of the teaching model, it is recommended to strengthen the career-oriented modules, deepen the application of project-based learning (PBL) and situational simulation, adjust the course content to improve its cutting-edge and practicality, and enhance students' industry insight and market awareness through university-enterprise cooperation and industry exchange activities. Meanwhile, the four aspects with low PNI scores (PNI: 0.02-0.03) show that students are generally satisfied with the current situation of industry expert guidance, instructor feedback, team communication, and conflict management, which indicates that the current teaching has been effective in the acquisition of industry resources, feedback mechanisms, and the cultivation of teamwork, or that the students are not aware of these issues. These advantages should be maintained in the design of the teaching model, and the teaching effect should be further enhanced through diversified practical forms (e.g., interdisciplinary projects, scenario simulation, role-playing). In

terms of resource allocation, priority should be given to areas of higher PNI demand (e.g. career development, market sensitivity, etc.), while these lower items can be used as a secondary optimisation direction to ensure that the teaching model can not only meet the core developmental needs of the students, but also consolidate the existing teaching results.

Semi-structured interview data complement this qualitative dimension of the status quo from the multiple perspectives of stakeholders. Feedback from business representatives focuses on the deep-seated contradiction between talent supply and market demand. The deficiencies of fresh graduates in professional skills such as software operation, construction drawing standardisation and material application, as well as in professionalism such as communication skills, stress resistance and teamwork awareness, reflect the systematic deficiencies of the current education system in the talent cultivation model. Education experts, on the other hand, have pointed out more fundamental problems from the perspective of the teaching system: the disconnection between theory and practice in the curriculum system, the singularity of the assessment mechanism, and the superficiality of school-enterprise co-operation, etc., the existence of which seriously restricts the improvement of the quality of education. In particular, the innovative model of ‘simulation company’ mentioned several times in the interviews reflects the urgent need of educators to break through the limitations of the traditional teaching model.

Through the cross-analysis of the questionnaire and interview data, the study found a noteworthy phenomenon: there is a high degree of consistency between students‘ competence development needs and enterprises’ employment expectations. The practical ability (75.87%), career adaptability (72.97%) and innovation and entrepreneurship (58.49%) that students most expect to improve form a significant mapping relationship with the core competency requirements highlighted by enterprise representatives in the interviews. This consistency of needs provides a clear directional guide for educational reform, and also reflects students' accurate perception of career development needs. In terms of expectations for teaching improvement, 82.43% of the

students emphasised the importance of strengthening the practical aspects, and 64.29% expected to improve the course content, which is highly in line with the reform directions of 'combination of science and reality' and 'gradual progression' suggested by experts in the interviews, reflecting the inherent logic and necessity of education reform. Deeper analysis also reveals several structural contradictions in environmental design education: 1, the tension between theoretical teaching and practical needs, which is not only reflected in the curriculum, but also in teaching methods and assessment mechanisms; 2, the time gap between professional education and market demand, the traditional education model is difficult to respond to the rapidly changing market demand; thirdly, the adaptability between regional development and talent cultivation; and thirdly, the problem of the adaptability of regional development and talent cultivation.3,the problem of adaptability between regional development and talent cultivation, which directly affects the regional flow of talents and the sustainability of industrial development.

Based on these findings, the study concludes that the subsequent development of teaching models based on simulated companies needs to focus on the following dimensions: firstly, the organic unity of theoretical teaching and practical training should be established, and a real project practice environment should be provided through the operation of simulated companies; secondly, the systematic cultivation of vocational qualities should be focused on, especially the enhancement of high-level competencies, such as project management, risk response, etc.; thirdly, the in-depth cooperation between schools and enterprises should be strengthened. Thirdly, the deep cooperation between schools and enterprises should be strengthened to establish a market-oriented talent cultivation mechanism; fourthly, the assessment system should be innovated to establish a multi-dimensional and process-oriented competence evaluation mechanism.

At the same time, the study has also identified some issues that deserve in-depth discussion: how to maintain the basic and systematic nature of education while improving its responsiveness to market demand? How to balance the contradiction

between regional development needs and students' career development demands? How to build a curriculum system that meets current needs and is forward-looking at the same time? The answers to these questions will directly affect the effectiveness and sustainability of the implementation of the teaching model. The existence of these deep-rooted problems also reminds us that education reform cannot only stay in the surface change of teaching methods and curriculum, but needs to be systematically thought and designed from the concept of education, system construction, mechanism innovation and other levels.

2 Development of a teaching model based on a simulated company (corresponding to research objective 2)

Based on an empirical analysis of the current state of environmental design education in Xinxiang City, Henan Province, this study employed questionnaire surveys and semi-structured interviews to identify significant deficiencies in the integration of theory and practice, diversity of evaluation mechanisms, and the depth of university-industry collaboration within the current educational system. Respondents from both industry and educational sectors indicated that traditional teaching models inadequately foster students' comprehensive professional competencies, while unanimously recognizing the “simulated company” as an innovative approach capable of overcoming these limitations. Questionnaire results further revealed that students generally expressed strong expectations to enhance practical abilities such as project management and risk response, as well as to deepen their understanding of industry developments, thereby better adapting to future professional environments.

At the theoretical level, the model is grounded in Outcome-Based Education (OBE), cooperative education, and constructivist learning theory, emphasizing learning outcomes as the core, university-enterprise collaboration as the pathway, and active knowledge construction by students as the process. In practice, the model highly simulates authentic corporate environments and business processes, incorporating project-driven teaching, industry mentor guidance, and practical workshops. This enables students to a

pply theoretical knowledge, refine operational skills, and develop teamwork and career adaptability in near-authentic scenarios.

The implementation of the teaching model follows a systematic construction pri nciple: first, designing teaching objectives and evaluation systems centered on core co mpetencies; then, establishing a simulated company platform and introducing real-world projects; finally, integrating diverse teaching methods and continuous feedback mecha nisms to steadily optimize teaching effectiveness. The model not only helps bridge the g ap between educational supply and market demands but also comprehensively enhanc es students' professional satisfaction, employability, and career development potential, offering a viable pathway for cultivating practice-oriented talents with comprehensive co mpetencies in the field of environmental design.

2.1 Teaching model design (draft)

After careful analyses, design and research, a draft of a teaching model aimed at improving the work competence of environmental design students has been drawn up. The following analyses were carried out according to the formation process of this model until the introduction of the draft teaching model.

Figure 27 Model Diagram for Improving Work Ability of Environmental Design Students (Draft)

Source: Zhao Yajun

The above diagram displays the specific model for enhancing students' work capabilities as follows:

A1 - Communication Ability: Includes design concept expression, intra-team communication, conflict resolution, listening, and feedback skills. These skills are crucial for students to effectively communicate and collaborate in a team setting.

A2 - Innovation and Entrepreneurship Ability: Covers innovative thinking, entrepreneurial practice skills, business risk assessment, and market insight. These abilities help students think and act creatively when facing new opportunities.

A3 - Practical Ability: Includes knowledge of design software, construction management, material and process application, project completion summary, and reflection. These skills enable students to apply theoretical knowledge in practical work and learn from experience.

A4 -Career Adaptability: Includes environmental adaptation, knowledge transfer, psychological adaptation, continuous learning, career planning, market adaptation, professional ethics, and sense of responsibility. These capabilities help students adapt to a constantly changing work environment and plan and manage their careers.

A5 -EmployabilityIt： Includes professional knowledge and skills, career planning, market adaptability, and professional ethics and sense of responsibility. These abilities help students demonstrate their qualifications during job seeking, plan career development, adapt to market demands, and exhibit professionalism and responsibility at work.

This model diagram provides a structured approach to identify and cultivate key capabilities required by environmental design students in their professional careers. The sub-components of work capabilities that environmental design students need to improve include:

1. Communication Ability, which will mainly enhance the following four sub-skills: Design concept expression refers to the ability to clearly and accurately convey

one's design ideas, creativity, and proposals to others, either verbally, in writing, or visually, which is crucial for gaining recognition and cooperation; Conflict resolution skills involve the ability to identify and handle disagreements during communication, including effective negotiation, mediation, and finding solutions that satisfy all parties' interests to maintain team harmony and project progress; Listening and feedback skills emphasize active listening skills in communication, understanding others' viewpoints, and providing constructive feedback, which helps build trust, promote knowledge sharing, and improve work outcomes; Intra-team communication skills refer to the ability to effectively communicate information, coordinate tasks, and collaborate within a team, requiring individuals to express clearly, listen actively, and integrate team members' contributions effectively.

2. Innovation and Entrepreneurship Ability, which will mainly enhance the following four sub-skills: Innovative thinking ability, reflected in innovation and entrepreneurship skills as the ability to transcend traditional thinking patterns, identify new problems, and propose original solutions, key to driving new ideas and product development; Entrepreneurial practice skills: refer to the ability to transform innovative ideas into practical business actions, including developing business plans, organizing resources, leading teams, and implementing new ventures or projects; Business risk assessment: in innovation and entrepreneurship, it is the ability to identify, analyze, and manage risks associated with new business opportunities, crucial for ensuring sustainable enterprise development; Business market insight: involves a deep understanding of market trends, consumer behavior, and competitive environments, enabling entrepreneurs to seize opportunities and develop effective market entry and expansion strategies.

3. Practical Ability, which will mainly enhance the following four sub-skills: Design software operation skills, in practical skills refer to the proficiency in mastering and applying various design software for efficient and accurate drawing and modeling, which is the foundation for realizing design intentions and improving work efficiency; Construction management ability, manifested as the ability to effectively organize,

coordinate, and supervise construction projects during the practical process, ensuring construction is completed according to design requirements and on schedule; Material and process application skills, refer to an in-depth understanding and appropriate use of various materials and construction techniques in design and construction practice to achieve the expected design effects and quality standards; Project completion summary and reflection, in practical skills represent the ability to review and evaluate the entire work process after project completion, drawing on experience, identifying shortcomings, and providing improvement directions for future projects.

4. Career Adaptability, which will mainly enhance the following four sub-skills: Environmental adaptation skills enable individuals to work effectively in a constantly changing work environment by understanding and integrating into different cultures and organizational structures, demonstrating high professional flexibility and adaptability; Knowledge transfer skills involve effectively conveying professional knowledge and information to others, requiring individuals to have profound professional knowledge and clear communication and teaching abilities to ensure accurate transmission of knowledge; Psychological adaptation skills refer to the ability to maintain a positive attitude and mental health in the face of stress and challenges, including managing emotions, building resilience, and adapting psychologically to new situations and changes; Continuous learning skills reflect the individual's desire for new knowledge and attitude towards lifelong learning, constantly updating and expanding their knowledge base to keep up with industry development and changing professional requirements.

5. Employability, which will mainly enhance the following four sub-skills: Professional knowledge and skills are the foundation of employability, referring to the specific field theories and practical skills mastered by individuals, which directly affect their ability to perform work and provide necessary credentials for job seeking; Career planning in employability is reflected as an individual's conscious design and planning of their career development path, including setting career goals, planning career paths, and taking actions to achieve these goals; Market adaptability refers to an individual's

sensitivity to labor market changes and the ability to adjust themselves to meet market demands, including understanding industry trends, quickly learning new skills, and maintaining competitiveness in different work environments; Professional ethics and sense of responsibility in employability are manifested as an individual's adherence to ethical standards, integrity, and professional behavior in work, as well as a sense of responsibility for work outcomes and contributions to the team, which helps establish professional reputation and win the trust of colleagues and employers.

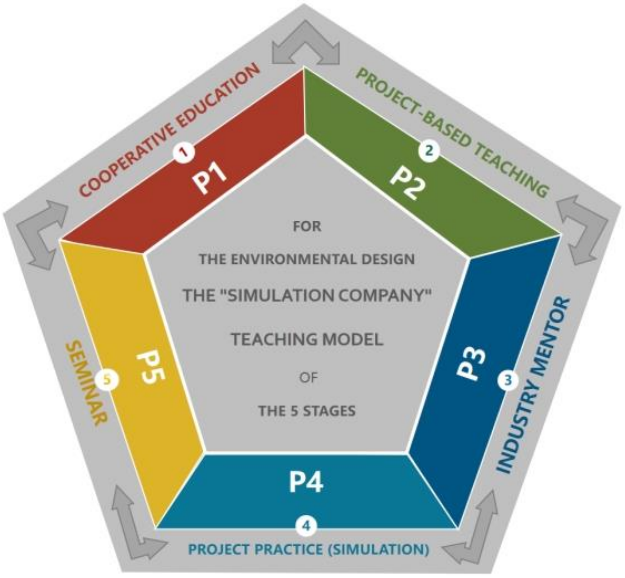

Figure 28 Teaching Phases (Project Phase) of the "SC" Instructional Model in Environmental Design (Draft)

Source: Zhao Yajun

The above diagram illustrates the draft model of the five-stage model of the "simulated company" teaching model for environmental design: Through these five stages, it integrates cooperative education, project-based teaching, industry mentor guidance, project practice (simulation), and seminars, forming a cyclical and interactive teaching system.

Specific explanations for each stage of the "simulated company" teaching model:1-Pre-project Communication Stage : This stage focuses on the preparatory work before project initiation, where students learn how to effectively communicate with clients to clarify project objectives, requirements, and expected outcomes. Students will practice skills in listening, questioning, and recording key information to ensure a clear understanding of the project.

P2-Project Conceptual Design Stage : In this stage, students will apply creative thinking skills, conduct brainstorming sessions, and generate design concepts. They will learn how to translate client needs and site conditions into innovative design solutions and begin creating preliminary design sketches and conceptual models.

P3-Detailed Design Development Stage : Students further develop and refine their concepts into detailed design plans in this stage. This includes selecting appropriate materials, colors, lighting, and layouts. Students will learn how to use design software to create precise technical drawings and 3D renderings.

P4-Design Construction Guidance Stage: This stage simulates the construction process, where students learn construction management skills, including supervising construction progress, ensuring the accuracy of design implementation, and solving on-site issues. They will also learn how to communicate effectively with contractors, suppliers, and engineers.

P5-Project Delivery Summary Stage : The final stage involves the final delivery and evaluation of the project. Students will present their design outcomes, gather feedback, and conduct a project debrief. This stage is about critical thinking and self-reflection; students will assess the successes and areas for improvement in the project.

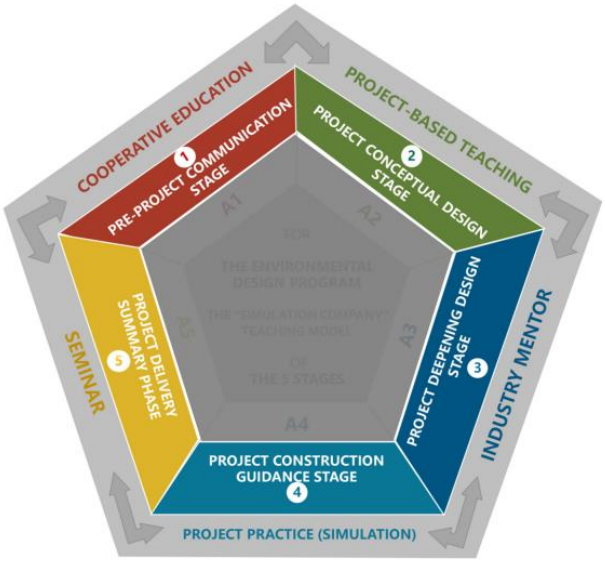

Figure 29 Teaching Methods of the "SC" Instructional Model in Environmental Design (Draft)

Source: Zhao Yajun

Figure 30 Detailed Explanation of Teaching Methods in the "SC" Instructional Model (Draft)

Source: Zhao Yajun

The five teaching methods outside the shaded area in the two images above can be applied cyclically or simultaneously to the teaching model, including:

1. Project-Based Teaching: It allows students to learn by participating in design projects with practical application value. This method enables students to apply theoretical knowledge in practice, thereby enhancing their ability to solve complex environmental design problems.

2. Cooperative Education: Through close cooperation between schools and design companies, it provides students majoring in environmental design with a valuable opportunity to combine academic learning with professional work practice. This model allows students to directly engage with the industry, gain valuable work experience, and understand industry needs.

3. Industry Mentor Guidance: Industry mentor guidance is an important part of environmental design education, providing students with professional guidance and feedback by hiring experienced experts in the environmental design industry. This one-on-one guidance helps students gain an in-depth understanding of industry standards, design processes, and career expectations.

4. Simulation: It provides students with a simulated real work environment, allowing them to learn and practice in a controlled risk environment. Through this simulation practice, students can experience the entire design process from conceptual design to construction management, preparing them for their future careers.

5. Seminar: It provides a platform for communication and discussion for students at the beginning and end of the course. These discussions not only promote the exchange of ideas among students but also enhance their critical thinking and expression skills, helping them form their own perspectives and styles in the field of environmental design.

These teaching methods interact cyclically or simultaneously within the teaching model, ensuring that students can develop their professional skills and professional qualities in a multi-dimensional, interactive learning environment. Through this comprehensive teaching approach, students not only acquire the necessary professional knowledge but also cultivate key professional abilities, preparing them for their future careers.

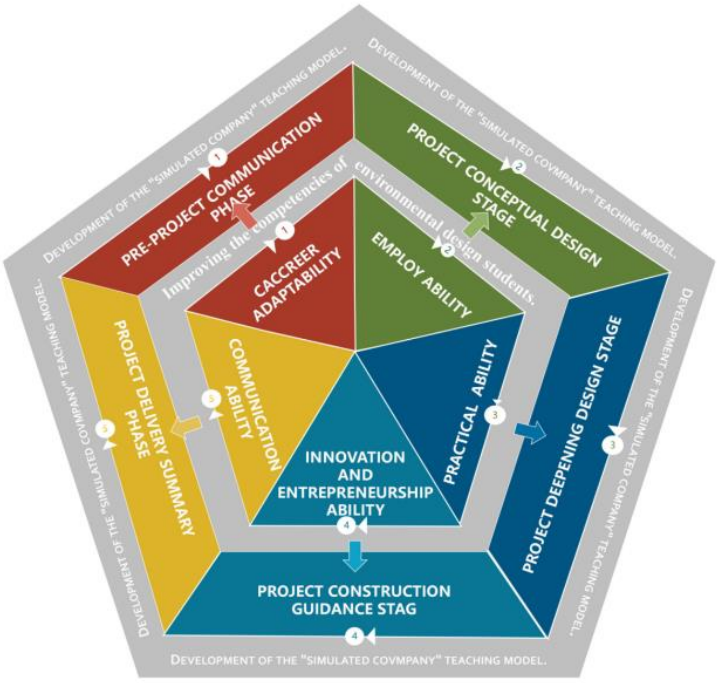

Figure 31 Overall "SC" Instructional Model Diagram for Environmental Design (Draft)

Source: Zhao Yajun

3 Adaptability and Feasibility Verification of the Teaching Model (Corresponding to Research Objective 3)

To ensure that the development and design of the "Simulated Company" teaching model for the Environmental Design major at universities in Xinxiang, Henan, can comprehensively enhance students' work capabilities and that the curriculum design meets China's national strategy and educational quality standards, researchers have formed an expert focus group. This group includes four experts related to teaching and three in

dustry-related experts. These teaching experts possess rich experience in teaching and research and can provide comprehensive support from macro-management, academic depth, and practical feasibility perspectives. At the same time, industry-related experts have been selected. Through this selection of professional diversity and balance, the focus group can comprehensively consider various aspects such as teaching, management, market, and practical operations to ensure the scientificity, practicality, and forward-looking nature of the "Simulated Company" teaching method curriculum design. The members of the focus group come from different professional backgrounds, covering multiple related fields to the Environmental Design major, ensuring the comprehensiveness and diversity of the curriculum design: members come from teaching management, academic research, business management, and design practice, ensuring that discussions involve teaching, management, practice, and market at all levels; personnel at different levels (such as professors, associate professors, deans, and corporate executives) are selected to ensure that discussions are in-depth and broad, and can balance theory and practical operations; priority is given to selecting members with rich practical experience to ensure that the curriculum design can effectively enhance students' work capabilities and employment competitiveness. The list of the focus group is as follows in the table below:

Table 32 Focus Group List

No	name	Organization	Position	professional background	Main teaching/research/work orientations
1	Dong Xinjian	Henan University of Science and Technology	Dean of Faculty	Urban Planning and Design	Teaching and Research in Design
2	Wang Dong	Henan Normal University	Professor	Environmental Design	Project Design and Practice
3	Zhang jing	Xinxiang Academy	Professor	Environmental Design	Practice Teaching
4	Xu Qing	Henan University of Technology	lecturer	Environmental Design	Multidisciplinary integration

5	LI Wenbiao	Chaowei Construction Group Co., Ltd.	CEO	Environmental Design	Architectural Practice	Design
6	Yang Hua	Henan Youhua Architectural Decoration Design Co.	CEO	Environmental Design	Architectural Practice	Design
7	Li Shen	Henan Yisu Decoration Engineering Design Co.	Design Director	Environmental Design	Project Design and Practice	

3.1 Focus Group Evaluation on the Applicability and Feasibility of the Teaching Model (Draft)

Experts were invited to evaluate the appropriateness and feasibility of the teaching model development (draft) for this study, as follows:

Table 33 Evaluation Results of Applicability and Feasibility of the Instructional Model (draft)

No.	Applicability				Feasibility			
	Mean	Std. deviation	Percentage	level	Mean	Std. deviation	Percentage	level
1.Name of the model	5.0	0.0	100	5	5.0	0.0	100	5
2.Diagram of 5 work competencies that environmental design students need to improve	4.57	0.51	91.4	5	4.43	0.50	88.6	4
3: Model diagram of the 5 teaching phases of the “simulation company” teaching model	4.71	0.48	94.2	5	4.57	0.51	91.4	5
4: Model of the support mechanism of the “Simulation Company” teaching mode	4.71	0.48	94.2	5	4.43	0.50	88.6	4
5. A diagram of the “Simulation Company” teaching model for environmental design students (overall design scheme)	4.29	0.62	85.8	4	4.71	0.48	94.2	5
6. Logic of the teaching model structure	4.86	0.35	97.2	5	4.71	0.48	94.2	5

7. Components of the teaching model	4.86	0.35	97.2	5	4.86	0.34	97.2	5
8. Research steps of the teaching model	4.86	0.34	97.2	5	4.43	0.50	88.6	4
9. Scalability of the pedagogical model	4.71	0.48	94.2	5	4.71	0.48	94.2	5
10. Evaluation and feedback mechanism of the teaching model	4.43	0.50	88.6	4	4.57	0.51	91.4	5

(1) Results Analysis

In this study, the researchers categorized the Level based on the mean value into five levels, with Level 5 representing the highest level. Given that the mean value is close to 5, this level is therefore set as Level 5. From the data in the table, it is evident that the overall evaluation results of the model's suitability by seven experts reached the highest level at 97.2% (mean value x=4.86, standard deviation SD=0.35), and the results for evaluating the feasibility of the model are also at the highest level of 97.2% (mean value x=4.86, standard deviation SD=0.34).

The following are the analysis results for each project: Model name analysis: Both applicability and feasibility scores have reached the highest possible (average = 5), reflecting that students generally consider the model name to have extremely high clarity and ease of implementation. Analysis of the need for improvement in environmental design students' capabilities: The average applicability (M = 4.57) is slightly lower than the average feasibility (M = 4.43), indicating that students generally believe these capabilities need improvement, but hold a neutral to slightly positive attitude towards the feasibility of such improvements. Analysis of the "Simulated Company" teaching model stage: The average values for applicability and feasibility (M = 4.71 and 4.57) show that students have a positive evaluation of the teaching stage model. Analysis of the "Simulated Company" teaching model support mechanism: The average applicability (M = 4.71) is higher than the average feasibility (M = 4.43), revealing that students consider the support mechanism to be well-designed, despite the possibility of facing certain challenges during implementation. Analysis of the overall design plan for environmental design students in the "Simulated Company" teaching

model: The average applicability (M = 4.29) is significantly lower than the average feasibility (M = 4.71), indicating that students believe the design plan urgently needs substantial improvement. Analysis of the structural logic of the teaching model: The average values for applicability and feasibility (M = 4.86 and 4.71) show students' high recognition of the structural logic of the teaching model. Analysis of the components of the teaching model: The average values for applicability and feasibility (M = 4.86 and 4.86) indicate that students are highly satisfied with the model components. Analysis of the research steps of the teaching model: The average applicability (M = 4.86) is slightly higher than the average feasibility (M = 4.43), meaning that students believe the research steps are well-designed, although some difficulties may be encountered during implementation. Analysis of the scalability of the teaching model: The average values for applicability and feasibility (M = 4.71 and 4.71) show that students have a positive view of the model's scalability. Analysis of the evaluation and feedback mechanism of the teaching model: The average applicability (M = 4.43) is lower than the average feasibility (M = 4.57), indicating that students believe the evaluation and feedback mechanism needs optimization, but they hold an optimistic view of its implementation prospects.

(2) Suggestions from the Focus Group on the Teaching Model (Draft)

Regarding the adaptability and feasibility of the model, experts have given high praise to various aspects of the "Simulated Company" teaching model, which can be divided into the following issues:

1. Model Name: All experts unanimously agree that the model name is very appropriate, concise and clear, fully understanding its purpose. The naming of the model has received the highest score (5.0) in terms of applicability and feasibility, indicating that the model name accurately reflects its content, objectives, and educational methods, and there is no need for changes.

2. Work Ability Map: Experts rated the applicability of the five work competencies that environmental design students need to improve at 4.57, and the feasibility at 4.43. This indicates that although these competencies are highly valued,

there may be some challenges in the implementation process that require further optimization and adjustment. Professor Dong Xinjian and other experts suggest: clearly define the competencies instead of using code editing, to avoid confusion and ensure that all users can accurately understand the meaning of each competency, it is recommended to provide clear descriptions and definitions for each competency, and add arrows to indicate their interrelationships. This will help students, teachers, and project participants clarify the specific requirements and expected outcomes for each competency. In addition, to enhance the integrity and intuitiveness of the graphic, it is suggested to use a pentagon to display these competencies, which will help to more clearly convey the importance of each competency area and their interrelationships.

3. Teaching Project Process Stage Model Map: In the evaluation of the five teaching stage model maps in the "Simulated Company" teaching model, experts gave a high score of 4.71, believing that the design of these stages is not only highly consistent with teaching needs but also highly feasible in implementation. Experts particularly appreciate the design of this stage because they are closely connected with the actual operational processes of design companies, providing students with a valuable practical platform. However, to improve the clarity and practicality of the teaching stages, Professor Wang Dong suggests avoiding the use of codes, but rather providing clear names and definitions for each stage, to help students, teachers, and other stakeholders more intuitively understand the core content and teaching objectives of each stage.

4. Support Mechanism Teaching Strategy Model Map: Experts believe that the model map of the support teaching means may mean that the support mechanism is theoretically sound, but may require further adjustments and optimization in actual operation. Professor Wang Dong proposed: the combination of five teaching methods, including project-based teaching, cooperative education, industry mentor guidance, project practice, and seminars, can provide a multi-dimensional, interactive learning environment, which helps the development of students' professional skills and professional quality. However, there are also some potential drawbacks: 1 Resource

allocation issues: Implementing these teaching methods may require a lot of resources, including funds, facilities, manpower, etc. 2 Coordination difficulty: The combination of various teaching methods requires good coordination and management. Different teaching activities may require different arrangements and coordination, which may increase the complexity of management. However, if careful planning and resource allocation are ensured, teachers receive appropriate training, and students can obtain the necessary support. At the same time, regular evaluation and adjustment of teaching methods are also needed to ensure that they can effectively promote students' learning and development. Research will always encounter problems, overcoming them is fine, this part of the chart does not need to be modified!

5. Overall Design Map: This is the area with relatively low scores, with an applicability of 4.29 and a feasibility of 4.71. This indicates that the overall design map may need to be re-examined to improve its application effect in actual teaching. Experts suggest that the current version of the final model design map needs adjustments in certain details and color schemes. Additionally, it is currently considered incomplete and should avoid using codes for representation to prevent potential ambiguities and clarity issues.

6 .Teaching Model Structure Logic: Experts rated this part of the research logic as reasonable, with a high score of 4.86 in terms of applicability and feasibility, indicating that experts believe the structural logic of the teaching model is clear and easy to implement.

7. Teaching Model Components: Experts consider the components similar to the structural logic, also receiving a high score of 4.86, showing that the design of each component of the model is reasonable and easy to integrate and operate. This part of the research is considered reasonable.

8. Research Steps: The research steps of the teaching model received a score of 4.86 in terms of applicability, but a slightly lower score of 4.43 in terms of feasibility. This may indicate that the research steps are theoretically reasonable, but may require more consideration during implementation. Experts believe that in terms of

detailed model format and drawing methods, removing the name of the outermost circle and adding text for evaluation and feedback mechanisms should be more clear and purposeful.

9. Scalability: The scalability of the teaching model received a score of 4.71 in terms of applicability and feasibility, indicating that the model has good potential for expansion and can adapt to different teaching environments and needs. It can be promoted to different countries and majors in the future.

10 . Evaluation and Feedback Mechanism: The evaluation and feedback mechanism received a score of 4.43 in terms of applicability and 4.57 in terms of feasibility. This may indicate that the evaluation and feedback mechanism is effective in design, but may require further refinement and adjustment in practice. Prof. Zhang Jing and Chairman Li Wenbiao believe that the model should supplement the instructions for the evaluation feedback mechanism, as the evaluation and feedback mechanism can be flexible and mobile according to the teaching model, because the design customers and design requirements encountered in actual situations are variable and do not need to be particularly fixed.

In summary, experts unanimously agree that the teaching model based on simulated companies provides a well-considered and thoughtful framework for the development of teaching models for environmental design students' ability training. This model effectively reveals the relationships between various links through the use of clear color division, making the focus and goals of the design center clear at a glance. The teaching model focuses on enhancing the five key abilities of environmental design students, closely integrating these abilities with the five work links and processes of simulated companies. Through this one-to-one correspondence, the model focuses on exercising the skills students need in actual work environments. This design not only benefits teachers in environmental design majors to teach and improve teaching effectiveness, but also provides students with a risk-free simulated work environment, allowing them to try and make mistakes in a safe environment, thereby improving their work skills. This teaching model greatly promotes students' job preparation, as it

provides practical experience closely connected with industry standards and needs. This not only helps students adapt to the workplace faster after graduation but also improves their employment rate. Experts also emphasize that the promotion of this model will have a positive impact on the education sector, as it provides a reproducible and scalable framework that other related majors can adjust and apply according to their needs. In this way, the simulated company teaching model not only improves the quality of education in environmental design majors but also lays a solid foundation for students' future careers. In summary, the development and implementation of this teaching model are of great significance for the development of environmental design majors and the personal growth of students.

3.2 Model Optimization(Final Version)

Based on the above opinions, after research and adjustments, the researchers ultimately concluded a teaching model development (Final Version) to improve the work ability of environmental design students, which is mainly composed of the following 7 im portant parts:

1. Name of the teaching model:Environmental Design Major "Simulated Compa ny" Teaching Model

2. Model diagram: Environmental Design Major "Simulated Company" Teaching Model (Final Version)

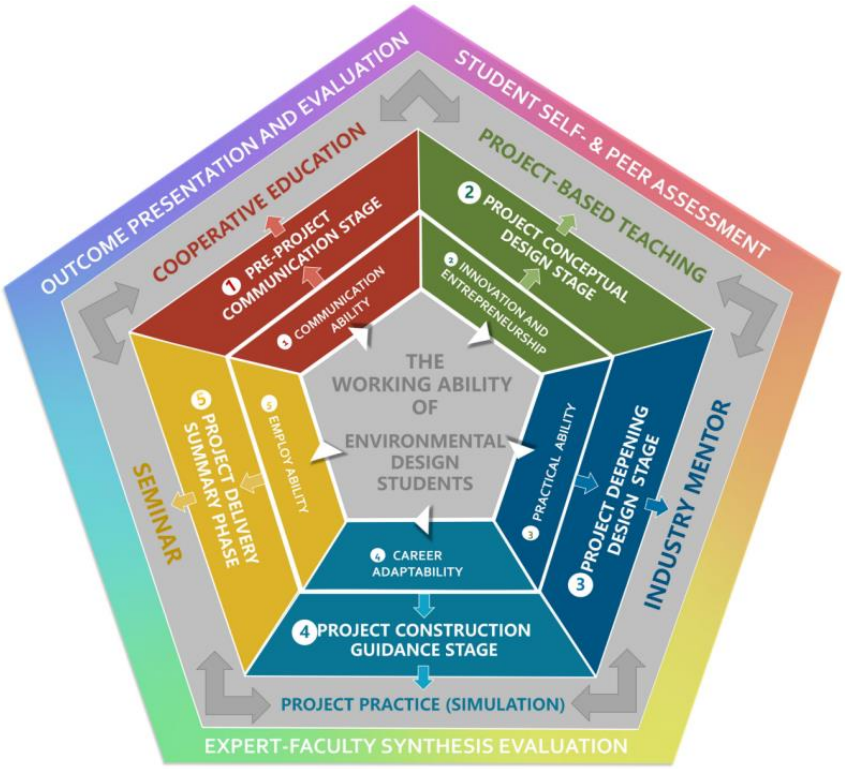

Figure 32 Overall Framework of the SC Instructional Model for Environmental Design (Final Version)

Source: Zhao Yajun

3.Theoretical Foundation of Instructional Model Development:The "Simulated Company" instructional model in the field of Environmental Design is deeply rooted in Outcome-Based Education (OBE), cooperative education philosophy, and constructivist learning theory. The core design objective of this model is to ensure the clarity and attainability of educational outcomes, ensuring that students can achieve predetermined learning outcomes through the learning process. Guided by the OBE concept, the instructional model focuses on setting clear learning objectives that are closely related to the core competencies of the Environmental Design field, such as innovative design thinking, project management, and communication and collaboration skills; the integration of cooperative education philosophy emphasizes interaction and collaboration among students, as well as collaboration with industry experts, which not

only promotes knowledge sharing and skill development but also simulates team collaboration in real work environments; constructivist learning theory posits that knowledge is constructed actively by learners rather than passively received. In the "Simulated Company" instructional model, students are placed in a simulated company environment, actively constructing and deepening their understanding of environmental design expertise through participating in project practice, case analysis, and problem-solving activities.

4.Importance and Benefits of the Instructional Model:The core value of this instructional model is reflected in its construction of a multi-dimensional and interactive learning environment, allowing students to experience professional practice in a simulated professional setting, thereby promoting a comprehensive improvement of their professional skills and professional literacy. Through this integrated instructional strategy, students not only master the necessary professional knowledge but also cultivate key professional competencies, laying a solid foundation for their future careers. In addition, the model also motivates teachers to continuously adjust and optimize instructional content and methods based on student feedback and industry needs, to maximize teaching effectiveness.

5.Objectives of the teaching model:Cultivate students' innovative thinking and entrepreneurial practical skills: enhance students' abilities in design concept presentation, team communication, business risk assessment, and market insight; through simulating the work processes and workflows of a company, train students' professional and market adaptability.

6.Elements of the teaching model:The main components of the "Simulated Company" teaching model in the Environmental Design major can be summarized from the inside out into three main core levels:

3.2.1 Simulated Company Teaching Model: Final Version Description

(1) Students work Ability: This is the foundational layer of the teaching model, aimed at improving the following abilities of students:A1-Communication

ability,A2-Innovation and Entrepreneurship ability,A3-Practical ability,A4-Career ability,A5-Employ ability.The light-colored outer part of this diagram provides specific explanations for each of the abilities from A1 to A5.

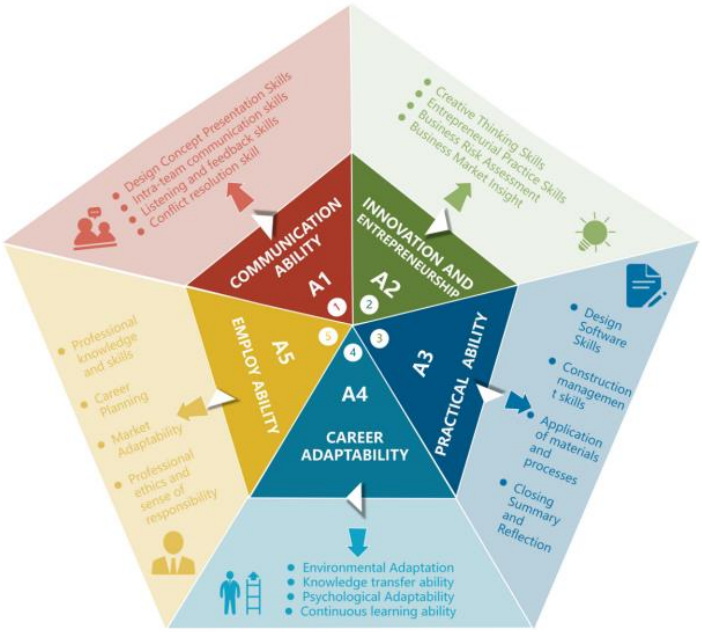

Figure 33 Model for Enhancing Work Ability of Environmental Design Students (Final Version)

Source: Zhao Yajun

(2) Based on the professional design workflow of environmental design companies, the model has developed the following five (Project Processes) teaching stages:

P1-Pre-Project Phase

P2-Project Conceptual Design Phase

P3-Project Deepening Design Phase

P4-Project Construction Guidance Phase

P5-Project Delivery Summary Phase

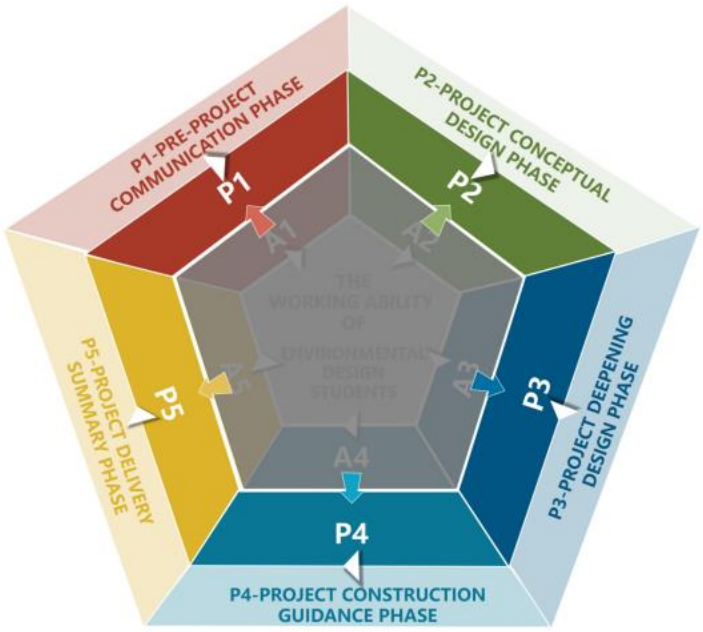

Figure 34 Teaching Phases (Project Phase) of the SC Instructional Model in Environmental Design (Final Version)

Source: Zhao Yajun

(3) The 5 teaching Methods of the "Simulated Company" teaching model (Teaching Strategies): These methods are the key approaches to achieving teaching objectives. When using the model, these five methods can be both interwoven and cyclical, and can be selected according to specific situations in teaching. Including:Project-Based Teaching,Cooperative Education,Industry Mentorship,Project Practice,Seminars.

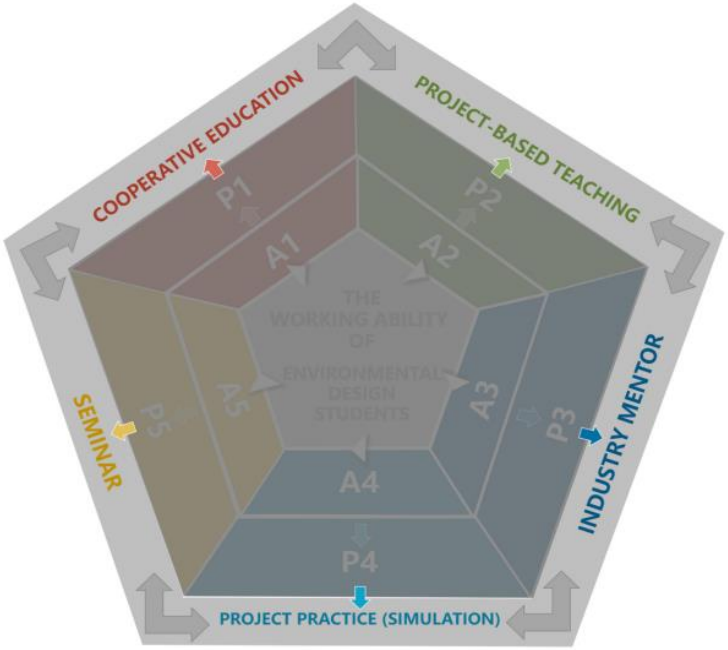

Figure 35 Teaching Methods of the SC Instructional Model in Environmental Design (Final Version)

Source: Zhao Yajun

(4) 5 Teaching Methods of the instructional model (Teaching Strategies): 5 teaching methods that can be cycled and applied simultaneously to the instructional model, including: project-based learning, cooperative education, industry mentor guidance, project practice, and seminars.

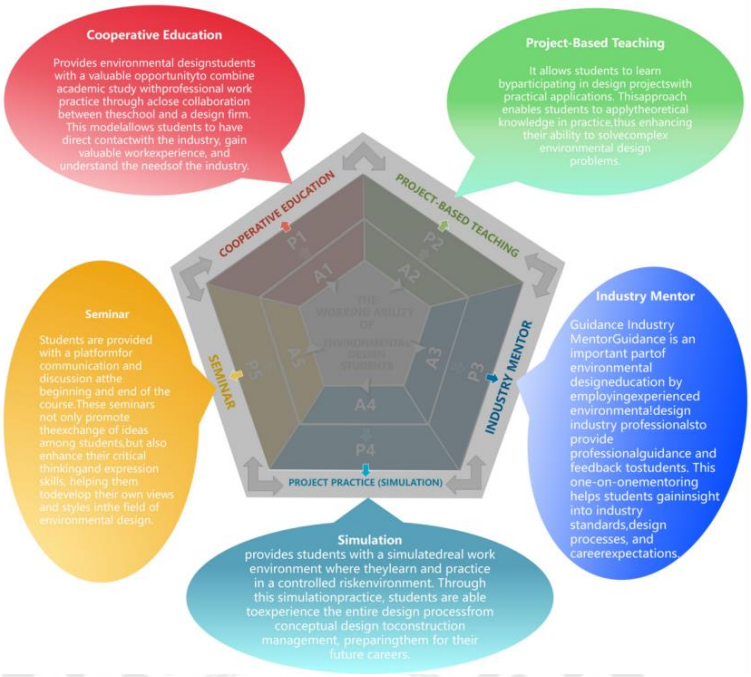

Figure 36 Detailed Illustration of Teaching Methods in the SC Instructional Model (Final Version)

Source: Zhao Yajun

Project-Based Teaching: It allows students to learn by participating in design projects with practical application value. This method enables students to apply theoretical knowledge in practice, thereby enhancing their ability to solve complex environmental design problems.

Cooperative Education: Through close cooperation between schools and design companies, it provides students majoring in environmental design with a valuable opportunity to combine academic learning with professional work practices. This model enables students to gain direct industry exposure, acquire valuable work experience, and understand industry needs.

Industry Mentor Guidance: Industry mentor guidance is an important part of environmental design education, providing students with professional guidance and feedback by hiring experienced experts from the environmental design industry. This

one-on-one mentorship helps students gain an in-depth understanding of industry standards, design processes, and career expectations.

Simulation: Provides students with a simulated real work environment, allowing them to learn and practice in a controlled risk environment. Through this simulation practice, students can experience the entire design process from conceptual design to construction management, preparing them for their future careers.

Seminar: Provides a platform for communication and discussion for students at the beginning and end of the course. These discussions not only promote the exchange of ideas among students but also enhance their critical thinking and expression skills, helping them form their own perspectives and styles in the field of environmental design.

(5) The quality evaluation mechanism for teaching effectiveness (Methods of Teaching Quality Evaluation), these three mechanisms ensure the quality and effectiveness of teaching activities, and can be used in any order, either simultaneously or selectively based on specific conditions in teaching. Including:

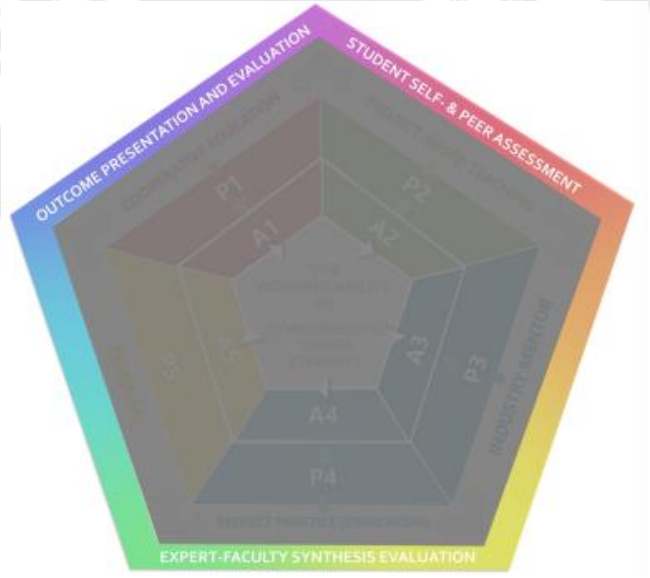

Figure 37 Teaching Quality Evaluation Framework for the SC Instructional Model in Environmental Design (Final Version)

Source: Zhao Yajun

Student Self- & Peer Assessment: Through self-evaluation and peer assessment, students are encouraged to engage in self-reflection and collaborative learning.

Expert-Faculty Synthesis Evaluation: Combining the diverse perspectives of industry experts and faculty, this provides comprehensive feedback that is both professional and academic.

Outcome Presentation and Evaluation: Through the public display of project outcomes, multi-dimensional evaluation and feedback are received.

The teaching model forms a cyclical interactive system through these three levels of elements, which interact with each other and simultaneously function within the teaching model. This structure ensures that students can learn autonomously in a multi-dimensional, interactive learning environment. In a non-destructive simulated work environment, students can not only improve their work skills but also enhance their self-confidence, ultimately achieving the desired teaching outcomes.

(6) Methods of Teaching Quality Evaluation:

In the teaching model, the quality evaluation mechanism is a key component to ensure the quality and effectiveness of teaching activities. These three mechanisms can cycle, repeat, and self-adjust autonomously. They not only monitor the learning process but also provide valuable feedback to students, helping them understand their performance and areas for improvement. The following are the three main assessment and feedback mechanisms:

Student Self- & Peer Assessment: Through self-assessment, students engage in a process of self-reflection, evaluating their own learning outcomes and progress. This mechanism encourages students to actively participate in the learning process, enhancing self-awareness and self-management skills. Through self-assessment and peer evaluation, students can more clearly recognize their strengths and areas needing improvement, thereby adjusting their learning strategies in a targeted manner and promoting self-reflection and collaborative learning.

Expert-Faculty Synthesis Evaluation: Evaluations from industry mentors and faculty provide feedback from both professional and pedagogical perspectives. Industry mentors, with their rich practical experience, can assess students' performance from the perspective of industry needs, offering insights and suggestions from real-world work situations. Faculty members, on the other hand, evaluate students' learning outcomes and levels of understanding from an academic and teaching standpoint. This dual evaluation system ensures that students receive comprehensive feedback from both theoretical and practical dimensions.

Outcome Presentation and Evaluation: Project outcome presentations are a form of public assessment where students present their project results to receive evaluations from peers, teachers, and industry mentors. This mechanism not only enhances students' communication and presentation skills but also allows them to receive feedback in real-world contexts, thereby better understanding the actual effects of their projects and potential areas for improvement.

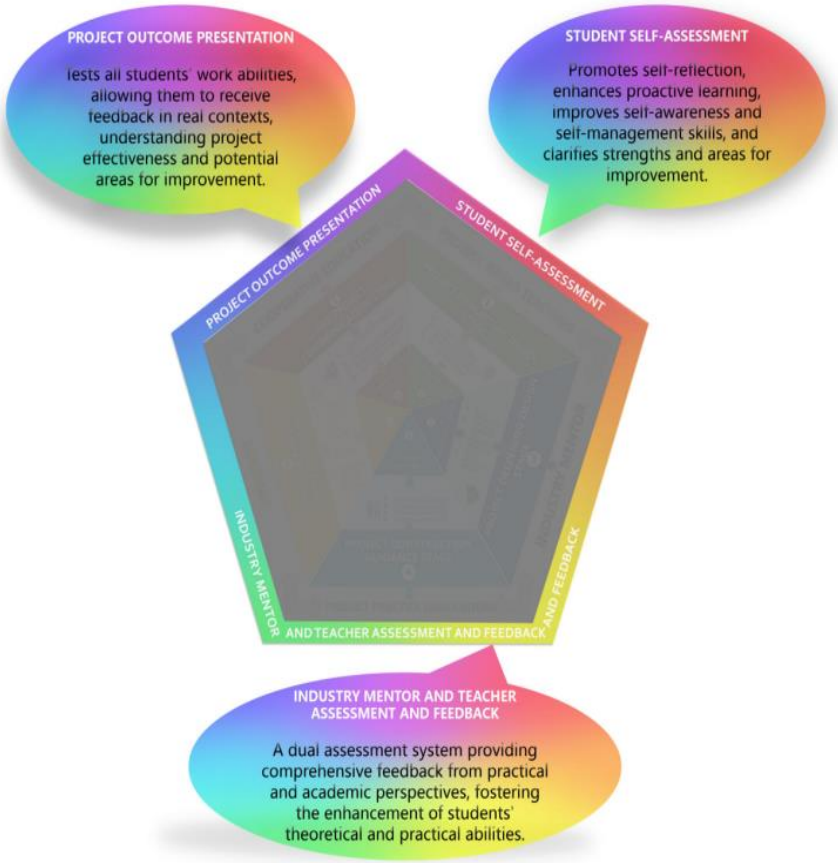

Figure 38 Teaching Quality Evaluation Framework for the SC Instructional Model in Environmental Design: Detailed Explanation (Final Version)

Source: Zhao Yajun

These three assessment and feedback mechanisms complement each other, forming a comprehensive quality assurance system. Through these mechanisms, the teaching model ensures that teaching activities match the actual needs of students and industry standards, while also providing a platform for continuous improvement and enhancement for students. This comprehensive evaluation system contributes to the improvement of teaching effectiveness.

3.3 Focus Group Evaluation on the Applicability and Feasibility of the Teaching Model (Final Version)

Re-invite experts to evaluate the appropriateness and possibility of the results of this study (final version of the teaching model development), specifically as follows:

Table 34 Evaluation Results of the Model's Applicability and Feasibility (Second Assessment, Final Version)

No.	Applicability				Feasibility			
	Mean	Std.deviation	percentage	level	Mean	Std.deviation	percentage	level
1.Name of the model	5.0	0.0	100	5	5.0	0.0	100	5
2.Diagram of 5 work competencies that environmental design students need to improve	5.0	0.0	100	5	5.0	0.0	100	5
3: Model diagram of the 5 teaching phases of the “simulation company” teaching model	5.0	0.0	100	5	5.0	0.0	100	5
4: Model of the support mechanism of the “Simulation Company” teaching mode	5.0	0.0	100	5	4.86	0.35	97.2	5

5. A diagram of the "Simulation Company" teaching model for environmental design students (overall design scheme)	4.86	0.35	97.2	5	4.83	0.38	96.6	5
6. Logic of the teaching model structure	5.0	0.0	100	5	5.0	0.0	100	5
7. Components of the teaching model	4.86	0.35	97.2	4	4.83	0.38	96.6	5
8. Research steps of the teaching model	5.0	0.0	100	5	4.83	0.38	96.6	5
9. Scalability of the pedagogical model	4.86	0.35	97.2	4	5.0	0.0	100	5
10. Evaluation and feedback mechanism of the teaching model	4.83	0.38	96.6	5	5.0	0.0	100	5

(1) Analysis of the 2nd Assessment Results

Based on the second focus group assessment,the model's evaluation index is rated at an average score of 5.0, with a standard deviation of 0.0, and a grade rating of 5, consistent with the initial assessment results. In terms of the work capability graph, both the average score and standard deviation are 5.0 and 0.0, with a grade rating of 5 (applicability), and the average score and standard deviation are 5.0 and 0.0, with a grade rating of 5 (feasibility), showing significant improvement. For the teaching phase model graph, the average score and standard deviation are 5.0 and 0.0, with a grade rating of 5 (applicability), and the average score and standard deviation are 5.0 and 0.0, with a grade rating of 5 (feasibility), indicating improvement. In terms of the support mechanism model, the average score and standard deviation are 5.0 and 0.0, with a grade rating of 5 (applicability), the average score is 4.86, the standard deviation is 0.35, and the grade rating is 5 (feasibility), showing improvement. For the overall design graph, the average score and standard deviation are 4.86 and 0.35, with a grade rating of 5 (applicability), the average score is 4.83, the standard deviation is 0.38, and the grade rating is 5 (feasibility), indicating improvement.

(2) Comparative Analysis of Evaluation Results from Two Consecutive Assessments

In the comparative analysis of the two assessment results, we observed that the model name received the highest evaluation in terms of applicability and feasibility, indicating a high level of general recognition for the model's naming and ease of implementation. In the second assessment, the applicability and feasibility scores for the work capability graph and the teaching phase model graph both increased, suggesting that these aspects have gained further recognition after optimization. The applicability score for the support mechanism model also increased in the second assessment, demonstrating the stability of this model in terms of applicability. Although the overall design graph score increased in the second assessment, it still ranked lower than other projects, indicating that there is still room for improvement in this area.

The overall trend of the second assessment results shows improvements in the model across multiple aspects, particularly in the work capability graph and the teaching phase model graph, which may reflect further optimization and adjustments to the model's details. Through this comparative analysis, we can identify improvements and adjustments in the implementation of the teaching model, as well as areas that may require more attention and resource investment. This continuous evaluation and feedback mechanism is crucial for ensuring the effectiveness and adaptability of the teaching model, and it contributes to the model's ongoing improvement and adaptation to changes in teaching needs.

3.4 Environmental Design Simulated Company Teaching Model: Design Description (Final Version)

This teaching model, developed through two rounds of focus group evaluations and rigorously revised based on expert feedback, establishes an instructional framework centered on the core principles of "competency orientation, practice driving, and reality simulation." It constitutes a multi-dimensional interactive teaching system designed to bridge the gap between theoretical education and practical application in environmental design education. By simulating real-world corporate operations, the model addresses critical shortcomings in traditional pedagogy, particularly the disjunction between academic training and professional

demands, thereby significantly enhancing students' overall employability and readiness for the workforce.

The model aims to cultivate five core competencies: communication ability, innovation and entrepreneurship, practical ability, career adaptability, and employability. To achieve these objectives, the teaching process emulates the workflow of an actual design company and is organized into five progressive project-based phases: preliminary project analysis, conceptual design, detailed design development, construction guidance, and project delivery and summary. Each phase is structured to facilitate layered and systematic competency development. The implementation employs five teaching methods—project-based learning, cooperative education, industry mentor guidance, hands-on project practice, and thematic seminars—which function dynamically, either cyclically or in parallel, to create an immersive and adaptive learning experience.A dual-loop optimization mechanism ensures the model's continuous improvement: the inner loop focuses on the real-time execution and refinement of teaching activities, while the outer loop facilitates macro-level model evolution. To further assure instructional quality, a triple-layer evaluation system is integrated into the framework. This system includes student self- and peer assessment to encourage reflective and collaborative learning, expert-faculty comprehensive evaluation to provide multi-perspective professional insights, and public outcome presentation and review to validate learning achievements through broader feedback. These complementary evaluation methods can be deployed collectively or selectively, forming an organic mechanism for sustaining educational quality and enabling iterative refinement.

The innovative significance of the model lies in its four-dimensional integration of "competency development, project phases, teaching methods, and quality assessment." By meticulously replicating the details of corporate operations within a simulated company environment, it transforms environmental design education from knowledge transmission to competency building, from passive learning to active innovation, and from separation between academia and industry to integration of

education and professional practice. This model provides a replicable and scalable theoretical and practical paradigm for advancing educational reform in environmental design and related disciplines.

CHAPTER 5
SUMMARY DISCUSSION AND SUGGESTION

A study on the development of a teaching model based on a simulation company to improve the work competence of students majoring in environmental design in Xinxiang City, Henan Province, China The objectives of the study were to 1. study the current situation and problems of environmental design majors in Xinxiang, Henan Province, China 2. develop a model of an environmental design curriculum to improve competence for universities in Xinxiang, Henan Province, China. 3. confirm the model of an environmental design curriculum to improve competence for universities in Xinxiang, Henan Province.

The researcher adopted the strategy of Mixed Method Research in this study. By selecting a sample of 1st-4th year students from all the five universities offering environmental design programmes in the region.The sources of information for this study were divided into four steps: 1) literature and existing studies related to the research topic; 2) questionnaires for environmental design students (quantitative research); 3) semi-structured interviews with managers and experienced designers of environmental design companies and experts and teachers of environmental design teaching (qualitative research); 4) focus groups on pedagogical models by inviting industry experts of environmental design companies and experts of environmental design teaching; and 5) focus groups on teaching and learning models by inviting experts of environmental design companies and experts of environmental design teaching. experts to conduct a focus group study on the teaching model.

The identification of the sample population at each step of the study was based on consideration of the purpose of the study and the type of data required, which played a key role in the research process. A variety of instruments were used to collect data for this study, including 1) questionnaires about current and desired states, 2) interview questionnaires designed to explore desired conditions and appropriate developmental approaches, 3) evaluation forms to assess the appropriateness and suitability of the comp

etency development model, and 4) an instructional model for improving student competencies.

1 Research Findings

1.1 Current Status and Challenges of the Environmental Design Major in Xinxiang City, Henan Province

Literature review shows that although the reform of environmental design education in China has been continuously promoted, its development speed has failed to keep pace with the rapidly developing needs of the industry, resulting in an obvious gap between the trained talents and the market demand in terms of professional ability.

Recent research by Chinese scholars highlights significant challenges in environmental design education, including a misalignment between the educational system and market needs, insufficient practical training, and inadequate cultivation of innovation capabilities. Specific issues consist of outdated curricula, limited integration of new technologies and interdisciplinary approaches, scarce hands-on project experience, and few internship opportunities, all of which weaken graduates' employability and innovative capacity.While proposed solutions include strengthening practical teaching, enhancing interdisciplinary integration, and deepening industry-academia collaboration, most studies remain theoretical and lack systematic implementation or curriculum model innovation. There is a pressing need to develop teaching models that thoroughly integrate theory and practice(XuJing, 2023).A comparative analysis with European and American approaches reveals that overseas institutions often emphasize theory-practice integration through intensive training, workshops, and cross-disciplinary projects, effectively enhancing students' professional readiness and practical experience. Future efforts should focus on aligning education more closely with industry demands, updating curriculum structures, increasing practical training, and synchronizing educational reforms with industry developments to cultivate market-ready environmental design professionals(Yang, 2021).

In contrast, China's practical teaching links appear relatively weak, which largely limits the opportunities for students to accumulate practical project experience;

in terms of interdisciplinary integration, Europe and the United States focus on interdisciplinary co-operation in environmental design education, combining the natural sciences, sociology, psychology and other fields with design, which promotes the updating of design concepts and the enhancement of comprehensive capabilities. China's interdisciplinary integration is still in the early stage of exploration, and the flexibility and comprehensiveness of the curriculum is yet to be further strengthened; in terms of industry cooperation, design education in Europe and the United States is closely linked to the industry. The employment of graduates and higher education in Italian design education also show the close connection between design education and industry(Yuanyuan, 2020).China's industry cooperation model is gradually improving, but it still needs to deepen the participation of enterprises and broaden the depth of cooperation; in terms of the cultivation of innovation and independent learning ability, in Europe and the United States, the education system places special emphasis on the cultivation of innovation and independent learning ability. The mechanism for cultivating innovative talents in the United States covers education, training and evaluation systems, aiming to provide students with a comprehensive learning environment and promote the development of their innovative spirit and independent learning skills. China's education system still needs to be continuously optimised in these key areas. The study reveals the strengths of foreign environmental design education in terms of combining theory and practice, interdisciplinary integration, industry co-operation, and innovation ability. China can learn from these experiences and combine them with China's actual situation to improve the education system and enhance the quality of teaching. Then, in the context of the current reform of environmental design education that needs to keep pace with the development of the industry, it is especially urgent to find an innovative and efficient teaching method.

Based on the current need to enhance students' professional competencies, this study proposes a teaching model that integrates the “simulated company” approach, offering environmental design students a risk-free yet authentic learning platform. By replicating real workplace structures, the model enables students

to develop both theoretical knowledge and practical problem-solving skills through project management, case studies, and simulated professional tasks. Industry experts provide real-time feedback, allowing students to adjust their learning strategies and improve professionalism iteratively.The model is grounded in three educational theories: OBE, which focuses on achieving predefined learning outcomes; Cooperative Education, emphasizing collaboration and communication in real-world settings; and Constructivist Learning Theory, which promotes active knowledge construction through initiative and creativity(Badkar & Mudgal, 2017). Together, these theories form a robust foundation for developing five key competencies essential for environmental design students, supporting their transition into future work environments with strengthened practical and adaptive abilities.

Xinxiang, a key urban center in Henan—China's most populous province—ranks among the top cities in the region in terms of both the number of higher education institutions and the size of its graduate population. Although the environmental design program was once highly popular among students, it now faces multiple challenges, including declining application rates, an increase in major-switching, and diminished employment expectations among graduates. Additional issues such as job instability and skills mismatch have collectively contributed to unsatisfactory employment outcomes. While Xinxiang leads the province in its number of environmental designers and has a vibrant design industry, it suffers from significant brain drain, with many talented graduates reluctant to remain in Henan for employment. Recognizing these issues, the municipal government has introduced policies to promote employment, including creating jobs, improving support mechanisms, and encouraging entrepreneurship(Government, 2024). This disconnect undermines their competitiveness in the job market. Addressing these challenges requires collaborative efforts across government, industry, educational institutions, and society—including enhanced vocational training, internship opportunities, entrepreneurial support, and more adaptable employment policies—to help graduates better navigate the evolving labor market and achieve both personal career growth and social value.

Based on the data, environmental design students show clear concerns regarding their employment prospects. Only 50.19% are willing to work in Xinxiang, Henan, while 46.91% express reservations, reflecting doubts about local job opportunities. Salary levels (71.24%) and career development (70.08%) are their top concerns. A significant gap exists in practical experience—71.04% lacked internship opportunities, impairing their job readiness and competitiveness. Additionally, students reported needing improvement in professional skills (64.48%) and communication abilities (41.51%). Interior design remains the dominant career choice (74.52%), though some opt for freelancing (9.65%). Over 70% of students worry about insufficient practical experience and skills, and more than 75% hope courses enhance practical and adaptive abilities, with 82.43% calling for more practice-oriented instruction.Interviews further reveal a mismatch between talent supply and market demand. Companies note graduates' inadequate professional competencies, while experts highlight disconnects between theory and practice, simplistic evaluation, and superficial university-industry collaboration. There is a clear need for educational innovation, such as the "simulated company" approach, to provide realistic, interactive learning that strengthens operational skills and career adaptability.

In summary, students prioritize economic and developmental factors in employment but face significant practical skill gaps. Education should thus offer more hands-on and participatory training, expanded career guidance, and increased internship opportunities to help students overcome employment barriers and improve competitiveness.

1.2 Developing a Teaching Model to Enhance Work Ability in Environmental Design (Full Version)

The complete teaching model for enhancing the work competence of Environmental Design students integrates eight core components: the name of the model, a teaching model diagram, the theoretical foundation guiding its development, its educational significance and benefits, clearly defined instructional objectives,

essential model elements, implemented teaching methods, and systematic evaluation and feedback mechanisms. The teaching model diagram is shown in Figure 38.

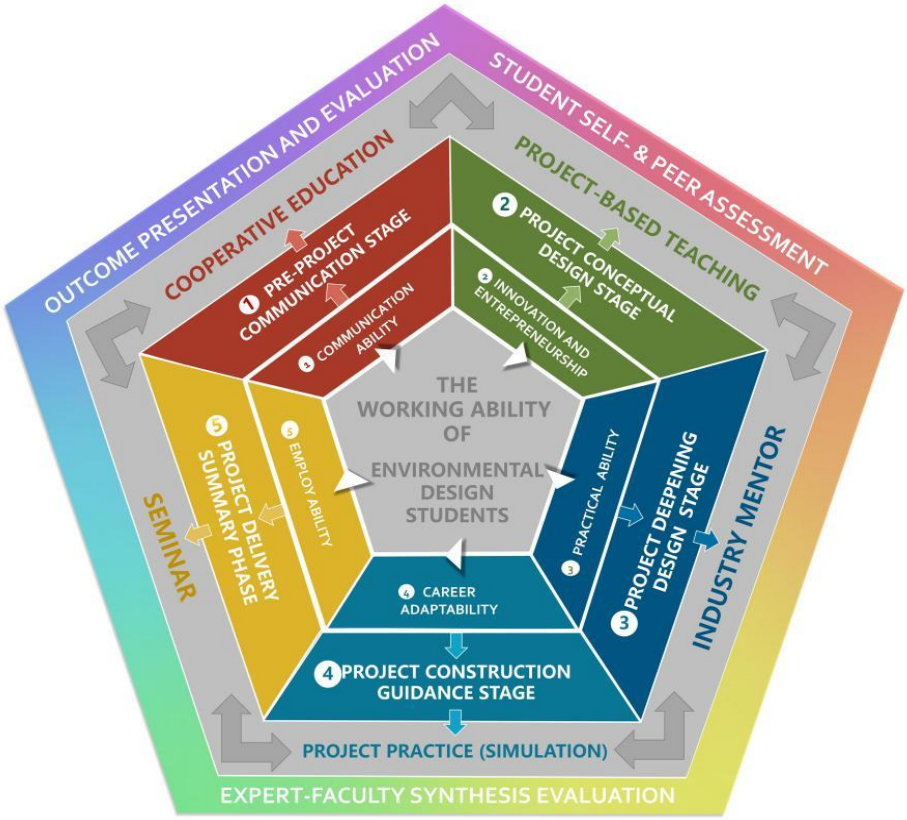

Figure 39 Model Diagram:Environmental Design “Simulated Company” Teaching Model (Full Version)

Source: Zhao Yajun

The Environmental Design "Simulated Company" Teaching Model is grounded in Outcomes-Based Education (OBE), cooperative education, and constructivist learning theory. It emphasizes achieving predefined learning outcomes by fostering core professional competencies—such as innovative design thinking, project management, and communication skills—through simulated real-world work environments and industry collaboration. This model supports the comprehensive development of students' professional skills and vocational literacy by integrating practical experience with reflective learning, while also enabling educators to iteratively

optimize instructional effectiveness through ongoing feedback. Its primary objectives include cultivating students' innovative and entrepreneurial capabilities, enhancing their competence in design conceptualization, teamwork, risk assessment, and market insight, as well as strengthening their occupational adaptability through simulated company workflows.

The model is structured around four core layers: (1) five key work abilities of students; (2) Five teaching phases based on simulated design company workflows; (3) five teaching strategies—project-based teaching, cooperative education, industry mentorship, project practice, and seminars—applied cyclically and simultaneously; and (4) three teaching quality evaluation methods: Student Self- and Peer Assessment, Expert-Faculty Synthesis Evaluation, and Outcome Presentation and Evaluation. These mechanisms operate in an iterative and adaptive manner, monitoring the learning process and providing actionable feedback to help students track performance and identify areas for improvement.The model innovatively integrates four dimensions: competencies, project phases, teaching methods, and quality evaluation. By accurately simulating real corporate operations, it shifts education from knowledge impartation to competency development, from passive learning to active innovation, and from academia-industry separation to integration. This offers a replicable and scalable paradigm for reforming environmental design education.

1.3 Assessment Results of the Final Version of the "Simulated Company" Teaching Model for Environmental Design

To determine the applicability and feasibility of the developed teaching model, a focus group was formed and conducted two rounds of evaluation, with the results as follows:

(1)Evaluation Results of the Teaching Model (Draft)

In the first assessment, the teaching model received high praise from the experts, particularly in terms of the appropriateness and feasibility of the model's name, structural logic, and components, achieving a score of 97.2% ($\bar{x}$ = 4.86, SD = 0.35). The work ability diagram and the research steps of the teaching model were rated at

91.4% ($\bar{x}$ = 4.57, SD = 0.51) and 97.2% ($\bar{x}$ = 4.86, SD = 0.34) for appropriateness, respectively, while their feasibility evaluations were slightly lower at 88.6% ($\bar{x}$ = 4.43, SD = 0.50). The overall design diagram received an appropriateness rating of 85.8% ($\bar{x}$ = 4.29, SD = 0.62) and a feasibility rating of 94.2% ($\bar{x}$ = 4.71, SD = 0.48). These scores reflect the model's recognition and potential effectiveness in various aspects, while also identifying areas that require further optimization and adjustment to ensure the model's effectiveness and adaptability in practical applications.

The expert panel highlighted several key areas for improvement: the work ability diagram needed clearer definitions and descriptions to enhance understanding and application; the teaching stages should have more explicit names and definitions to improve model clarity; the support mechanisms required further optimization in resource allocation and coordination management; the overall design diagram needed adjustments in detail and color, avoiding the use of codes to enhance its applicability; the research steps needed refinement, especially in model format and drawing methods; and the evaluation and feedback mechanisms required further refinement to adapt to the dynamic teaching environment. These adjustments will help enhance the model's practicality and effectiveness, ensuring that it can better promote student learning and development in actual teaching.

(2)Evaluation Results of the Teaching Model (Final Version)

Based on the first assessment results, the teaching model (Final Version) was r evised and submitted to the expert panel for a second evaluation of applicability and fea sibility. In the second assessment, the key components of the teaching model received extremely high ratings. The model's name, work ability diagram, teaching stage diagram, and structural logic all achieved perfect scores in both applicability and feasibility ($\bar{x}$ = 5.0, SD = 0.0). The support mechanism model received a perfect score in applicability ($\bar{x}$ = 5.0, SD = 0.0) and a highly rated score in feasibility ($\bar{x}$ = 4.86, SD = 0.35). The overa ll design diagram showed significant improvements with applicability rated at $\bar{x}$ = 4.86 (S D = 0.35) and feasibility at $\bar{x}$ = 4.83 (SD = 0.36).Additionally, other components received outstanding evaluations: the model components achieved $\bar{x}$ = 4.86 (SD = 0.35) for appli

cability and $\bar{x}$ = 4.83 (SD = 0.36) for feasibility; the research steps received perfect appli cability ($\bar{x}$ = 5.0, SD = 0.0) and high feasibility scores ($\bar{x}$ = 4.83, SD = 0.36); the scalabilit y was rated at $\bar{x}$ = 4.86 (SD = 0.35) for applicability and perfect for feasibility ($\bar{x}$ = 5.0, S D = 0.0); notably, the evaluation and feedback mechanism achieved perfect feasibility ($\bar{x}$ = 5.0, SD = 0.0) and high applicability ($\bar{x}$ = 4.83, SD = 0.38).These data collectively c onfirm the teaching model's excellent performance across all key areas, demonstrating both maturity in design and practical feasibility while providing a solid foundation for edu cational practice in environmental design. Experts particularly praised the revised model for its comprehensive improvements in visual design, content clarity, and logical structu re. Adjustments in color schemes, graphic elements, and layout significantly enhanced t he model's visual appeal and information accessibility. Simplified and optimized content improved implementability in educational settings, while modernized icons and intuitive layout strengthened usability and coherence. The enhanced evaluation and feedback m echanisms provide clearer guidance for dynamic teaching environments, and revisions i n academic language have increased the model's rigor and professional applicability.

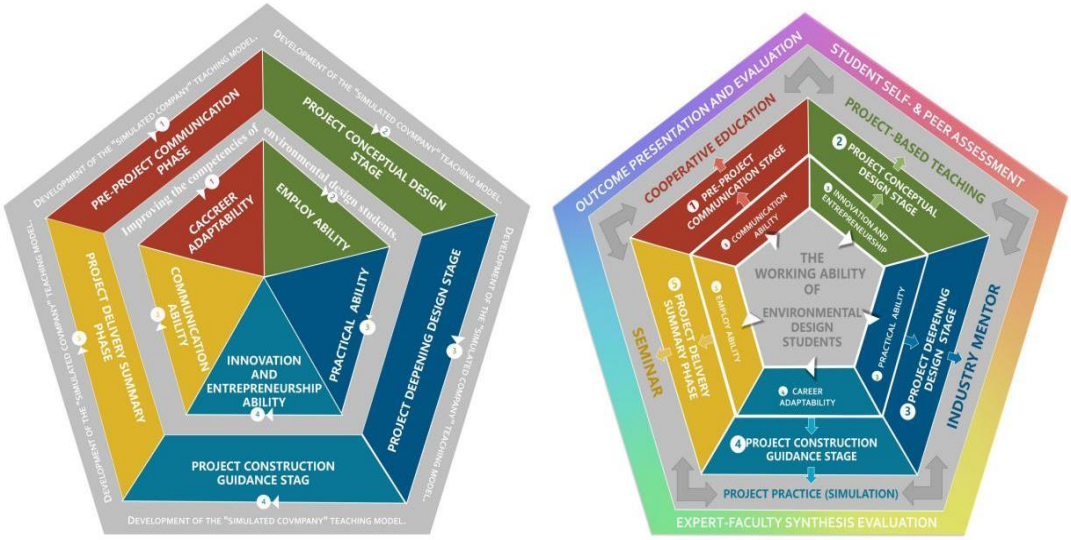

Figure 40 Teaching Model Design Comparison Chart

Source: Zhao Yajun

By comparing the final version of the teaching model with the draft, it can be observed that the final version has achieved significant improvements in several key aspects. First, adjustments in color and design elements have enhanced visual clarity and the distinguishability of information. Second, the refinement and clarification of content have made the model more comprehensible, which is crucial for educational implementation. Moreover, the modernization of graphics and icons has improved the model's intuitiveness and attractiveness. In terms of feedback and evaluation mechanisms, the final version provides clearer guidance, which is essential for ensuring the effectiveness of teaching activities and continuous improvement. The optimization of the overall layout ensures smooth information flow, helping users better follow the teaching process. Details such as the design of arrows and connecting lines further enhance the model's logic and usability. Finally, the professionalization of language and expression has elevated the model's academic rigor. These improvements collectively constitute a more efficient, user-friendly, and professional teaching model, providing a solid foundation for the educational practice of environmental design majors.

2 Discussion of Research Findings

Based on the research findings, the development of a teaching model for enha ncing the capabilities of environmental design students through a simulated company a pproach can be summarized in the following three aspects:

2.1 Analysis of the Current Status and Challenges of the Environmental Design Major in Xinxiang

The results for research objective 1 reveal numerous challenges faced by the e nvironmental design major in Xinxiang regarding students' job market preparedness. A s ignificant number of students are hesitant about seeking employment locally, reflecting t heir doubts about the local job market prospects. Salary levels and career development opportunities are identified as key considerations by students. However, the lack of inter nship experience has become a critical bottleneck constraining their practical abilities a nd job readiness. During internships, students also report deficiencies in communication skills and professional competencies, which to some extent weaken their competitivene

ss in the job market. For example, in the environmental design major at a university in Xi nxiang, although the curriculum covers various aspects of design theory and practice, st udents still show a disconnect from industry standards and actual needs in real project operations. Many students first encounter real project demands in their graduation desig n phase and struggle to quickly adapt to actual work scenarios. These findings indicate that the educational model should place greater emphasis on practice-oriented learning, increasing internship opportunities, and incorporating more interactive and practice-ba sed teaching methods, such as introducing the "Simulated Company" teaching model. This allows students to exercise skills in a simulated real-work environment, enhancing t heir team collaboration and project management abilities. This is consistent with the res earch by Cheng, who pointed out that the lack of practical training and industry involve ment significantly limits students' employability and emphasized the importance of integr ating real-world experience into design education(Cheng, 2022). Additionally, Highlighte d the integration of experiential learning into the curriculum, accumulating experience th rough internships, which can effectively bridge the gap between academic training and i ndustry expectations(Guo, 2023). Incorporating industry feedback and providing practic al experience is crucial for enhancing students' competitiveness in the job market(XuJin g, 2023). In summary, the environmental design major in Xinxiang still faces many challe nges in students' job preparation. The education system needs further optimization to en hance students' employability by increasing practical opportunities and refining teachin g methods to better meet the needs of industry development.

2.2 Development of a Teaching Model Based on a Simulated Company to Enhance the Capabilities of Environmental Design Students

The results of research objective 2 led to the development of a draft "Simulated Company" teaching model, an innovative approach aimed at comprehensively enhanci ng the professional capabilities of environmental design students to better adapt to the c omplex demands of future workplaces. The model particularly emphasizes the cultivatio n of students' multidimensional key abilities, including occupational adaptability, employ ability, practical ability, innovation and entrepreneurship, and communication skills. This

concept is highly consistent with the research by Cheng who stated that the cultivation of these skills is crucial for students' success in the rapidly changing job market, enablin g them to stand out in fierce competition(Cheng, 2022). The “Simulated Company” teac hing model is designed around five key project stages, deeply integrating industry-relev ant experience into the curriculum. By simulating real design projects, students are not o nly exposed to cutting-edge industry practices and technologies but also exercise their ability to tackle complex problems in a simulated environment, thereby enhancing their c apacity to meet the evolving demands of the environmental design industry. pointing out that integrating practice-oriented, industry-relevant knowledge into the curriculum can s ignificantly improve students' preparedness for professional challenges and help them b etter face various challenges in their future careers(Ju, 2023). This comprehensive teach ing method effectively bridges the gap between theoretical knowledge and practical ap plication, preparing students well for their future careers. It emphasizes the close alignm ent of curriculum content with industry standards, thereby enhancing graduates' compet itiveness in the workplace. Arguing that project-based learning in a simulated environme nt can help students develop core abilities directly aligned with industry needs, significa ntly enhancing their market competitiveness(Sheikh, 2023). Through this innovative teac hing model, students can accumulate valuable experience in a safe simulated environm ent, develop problem-solving skills, and lay a solid foundation for their future careers.

2.3 Appropriateness and Feasibility Analysis of the Simulated Company Teaching Model for Environmental Design

To validate the teaching model, the study evaluated its appropriateness and fea sibility and refined it through a second round of assessment. The revised version receive d high ratings across key components: the model’s name, ability diagram, and teaching stage diagram all achieved perfect scores in appropriateness and feasibility ($\bar{x}$ = 5.0, S D = 0.0). The support mechanism received full marks in appropriateness and scored hig hly in feasibility ($\bar{x}$ = 4.86, SD = 0.35), while the overall design diagram also showed nota ble improvement (appropriateness: $\bar{x}$ = 4.86, SD = 0.38; feasibility: $\bar{x}$ = 4.83, SD = 0.38). Experts commended the model’s enhanced visual design, clearer content organization,

and more logical structure. Improvements in color schemes, graphics, and layout boosted visual appeal and accessibility, and simplified content facilitated educational implementation. Updated icons and intuitive organization also improved usability and coherence. The evaluation and feedback mechanisms were refined to better adapt to dynamic teaching contexts, and academic language revisions strengthened rigor and professionalism.

The study underscored the importance of clearly defining core variables and procedures to help educators grasp foundational principles(Zhang, 2023). It also emphasized optimizing support mechanisms such as resource allocation and coordination, consistent with emphasis on bridging theory and practice(Yang, 2020). Finally, the model incorporated tailored evaluation mechanisms for each stage to maintain relevance in changing educational environments(Chernikova, 2020). These refinements culminated in a "Simulated Company" teaching model specifically designed for environmental design students.

2.4 Research Innovations

This study embodies significant innovations in the following three aspects, which both fill the gaps of existing research and provide both theoretical and practical contributions to the educational reform of environmental design:

(1) Theoretical innovation: the construction of teaching model with multi-theoretical integration

This study is the first to systematically integrate the theories of OBE, cooperative education and constructivism, and to propose a 'simulation company' teaching model for environmental design majors. The model transfers the simulation company teaching method from the traditional business field to the design discipline, combines the characteristics of the environmental design industry (e.g., project complexity, client demand orientation), redefines the path of competence cultivation, and forms a competence enhancement framework of the trinity of 'practice-collaboration-reflection'. This innovation breaks through the limitations of a single

theoretical perspective, provides a methodological reference for the development of interdisciplinary education models, and fills the gaps in existing research.

(2) Methodological innovation: mixed research design and localised validation

This study constructed a three-stage mixed research paradigm of 'demand-development-validation'.The core competency needs were identified through quantitative analysis (PNI index of 518 questionnaires), combined with qualitative research (interviews with 10 industry experts) to refine the elements of the course design, and finally the dynamic optimisation of the teaching model was achieved through focus groups (7 experts). Focusing on the education and industrial ecology of a third-tier city in China (Xinxiang), the study reveals the deep-rooted contradiction of the brain drain of design professionals in small and medium-sized cities and proposes a 'localised' solution. This methodological innovation provides a replicable teaching mode improvement path for universities in areas with relatively scarce educational resources, which has important practical value.

(3) Application innovation: full-cycle teaching model design for real scenarios

This study is the first to create a 'full-cycle simulation business project' teaching model, which introduces the real design needs of enterprises as a course project, and requires students to complete the whole process from demand analysis, programme design to customer reporting and construction guidance. The course adopts the 3-dimensional assessment mechanism of 'students' self-assessment and mutual assessment + industry tutor's rating + results demonstration and evaluation', breaking the traditional single-teacher evaluation mode. At the same time, this application innovation not only shortens the adaptation cycle of graduates from the 'classroom' to the 'workplace', but also helps the local design industry's talent pool, providing both theoretical and practical contributions to the reform of environmental design professional education.

2.5 New Knowledge from Research

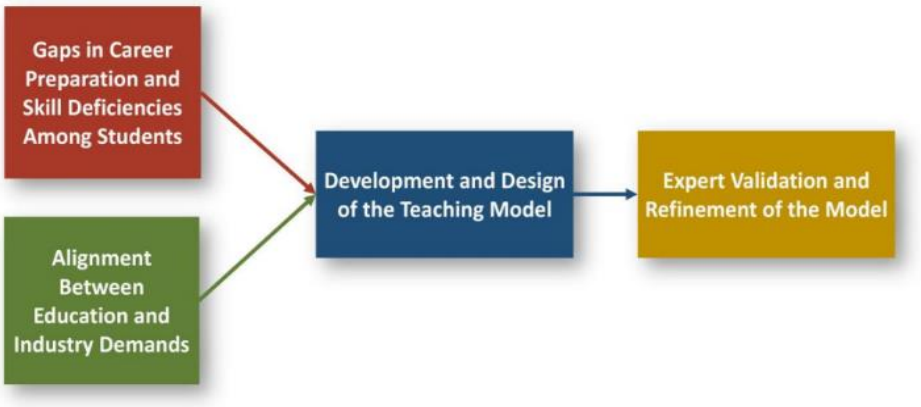

Figure 41 New Knowledge from Research

Source: Zhao Yajun

This study has conducted an in-depth exploration and improvement of teaching model design across four key dimensions,as illustrated in Figure 41. First, the study identified significant gaps in the career preparedness of environmental design students, particularly the lack of practical experience and key professional skills. This finding resonates with existing discussions in the literature regarding the misalignment between education and industry needs, emphasizing the importance of practice-oriented learning in the educational process. Second, the study highlighted the misalignment between educational content and industry needs, a long-standing topic in higher education research, especially in the context of adjusting trends in the environmental design major and matching regional key industries. Third, the study proposed the establishment of a simulated company teaching model to enhance students' occupational adaptability, employability, and key competencies. This teaching model aims to strengthen students' practical skills and professional literacy through a simulated real-work environment. Finally, through expert validation and iterative optimization of the teaching model, its feasibility and effectiveness were ensured. This included refining components such as the competency diagram, teaching stages, and support mechanisms. This iterative process not only underscored th

e role of expert input in aligning education with industry needs but also highlighted the i mportance of model validation and refinement in educational research. Through such re search and improvement, the efficiency and effectiveness of the educational system can be enhanced, better preparing students for their future career development.

3 Recommendations

Based on the research findings, the development of a teaching model for enha ncing the capabilities of environmental design students through a simulated company a pproach offers valuable suggestions and insights for enterprises, universities, teachers, and students:

3.1 Recommendations Based on Research Findings

(1) For Environmental Design Firms:

This study reveals the gap between the skills cultivated by universities and the actual job requirements in the environmental design industry in Xinxiang, Henan, China, and underscores the importance of close collaboration between universities and firms. Through such partnerships, firms can reduce the time and financial costs associated with training interns while directly participating in students' professional development, enabling early talent identification and cultivation. The “Simulated Company” teaching model, as an innovative educational approach, simulates a real company environment, providing students with opportunities to deeply understand and practice industry workflows. This enhances students' awareness of the professional standards and culture of the environmental design industry and serves as a platform for firms to screen and reserve potential talents. Moreover, firms' involvement in the teaching process ensures the synchronization of educational content with industry needs, fostering professionals who meet current and future market demands. This deep integration of education and industry not only boosts the overall competitiveness and innovation capacity of the environmental design sector but also drives the renewal of industry knowledge and skills and the development of innovative solutions. The study emphasizes the necessity of university-industry cooperation and the effectiveness of the “Simulated Company” teaching model in cultivating environmental design

professionals. In terms of talent reserves, firms may consider adopting the simulated company model tothe training and development of newly recruited employees from campus recruitment. Campus recruitment is a crucial pathway for firms to reserve future management and key talents.

The simulated company, as a bridge connecting students and firms, provides an extended observation window for firms to assess students' abilities and potential through direct observation of their work performance or indirect means such as performance evaluations and feedback. Firms can also use the simulated company platform to impart corporate culture and values to students, regularly communicate and mentor target students to form a talent pool. Furthermore, firms can establish targeted training mechanisms for students in the talent pool,new employee training, fully develop the potential of newly recruited campus employees, shorten their adaptation and periods after joining, and accelerate the talent conversion rate. During the interim between identifying candidates through campus recruitment and their actual onboarding, firms can leverage the simulated company platform within universities to assign relevant work tasks to the soon-to-be employees. This further reduces the costs and time spent on talent cultivation after onboarding, enhancing the efficiency of talent conversion. This study provides profound insights into the environmental design industry and offers practical strategies and methods for enterprises and universities in talent cultivation and reserves. Through the application of the simulated company teaching model, it is expected that more competitive and innovative design professionals will be cultivated to strongly support the industry's continuous development and innovation.

(2) For Universities Offering Environmental Design Majors:

The “Simulated Company” teaching model proposed in this study offers an innovative approach for environmental design education in universities, prompting a thorough review and necessary adjustments to existing curriculum content. It is recommended to incorporate the “Simulated Company” teaching model into the fourth-year curriculum, emphasizing its five project stages to systematically cultivate students' core professional competencies. Collaborating with industry mentors to introduce real

design challenges into the classroom ensures that the curriculum aligns with market demands and trends. Regular updates to the model based on feedback from students and industry experts will maintain its relevance and effectiveness in the ever-evolving field of environmental design. As a new model for university-enterprise collaboration and talent cultivation, the simulated company aligns with China's emphasis on deepening the integration of industry and education. This integration aims to reform talent cultivation models, promote the organic connection of the education chain, talent chain, industry chain, and innovation chain, and enhance the important role of enterprises in talent cultivation. It seeks to achieve a comprehensive integration of supply-side elements in talent cultivation and demand-side elements in the industry, fostering a large number of high-quality innovative talents and technical skills talents.

The simulated company platform closely connects enterprises, universities, and students, providing a new avenue for enterprises to participate in university education and strengthening their role in talent cultivation. As the talent supplier, universities can engage in thorough dialogue with enterprises, understand their talent needs, and tailor talent cultivation accordingly, facilitating the two-way alignment of industry-education supply and demand. Focusing on cultivating students' professional qualities and comprehensive abilities, the simulated company complements classroom teaching that imparts professional theoretical knowledge, jointly nurturing high-quality talents that meet societal and industrial demands. Unlike traditional classroom teaching, the simulated company emphasizes students' autonomy, allowing them to take on the role of employees to make independent business decisions and manage internal operations. Students grow through a “learning-by-doing” approach. Therefore, universities should provide necessary resource support while reducing control over the simulated company, using it as a talent incubation base and granting it ample freedom for development.

(3) For Teachers of Environmental Design:

When implementing the teaching model, it is essential to provide detailed guidelines and visual tools to clearly define the key steps and variables within the

model, ensuring effective implementation by educators. Additionally, optimizing resource allocation and management mechanisms will facilitate the model's smooth application across diverse educational settings. Developing targeted evaluation tools for each stage and incorporating feedback from educators, industry mentors, and students will enhance the model's adaptability through an iterative approach, meeting the evolving demands of educational and professional environments. The simulated company teaching method is expected to encourage educators to adopt more interactive, student-centered teaching approaches, such as project-based learning, cooperative education, industry mentorship, project practice, and seminars. These diverse teaching activities will not only promote student engagement but also stimulate innovative thinking and critical analysis while cultivating the ability to solve complex problems. Implementing this teaching method will pose new challenges to educators' practical skills.

Teachers will need to continuously update their professional knowledge to keep pace with the rapidly changing design industry and ensure the relevance and timeliness of teaching content. This requires educators to possess not only in-depth theoretical knowledge but also the ability to integrate theory with practice and guide students in project planning, execution, and evaluation. Throughout the teaching process, educators will assume multiple roles, including mentor, consultant, and evaluator, to support students' professional growth in the simulated environment. Overall, the simulated company teaching method will provide students with a platform for practice and innovation while offering new opportunities for educators' professional development. Through this approach, teachers can more effectively cultivate students' professional skills and innovation capabilities while driving continuous innovation in teaching methods and enhancing professional practice abilities. As the simulated company teaching method is further applied, it is anticipated to become an essential tool in environmental design education, increasing student engagement and professional capabilities while promoting ongoing innovation and development in teaching methods and professional practice.

(4) For Environmental Design Students:

The teaching model attempts to provide an innovative learning platform for students majoring in environmental design, establishing a direct connection between academic education and professional practice. It is recommended to offer more industry-related practical opportunities for students through the “Simulated Company” platform, providing experiential learning relevant to the industry. Additionally, implementing career guidance programs focused on the local job market can help students better understand and explore employment opportunities in Xinxiang. By simulating a real company operating environment, students will go through a five-stage learning process: initial project communication, project conceptual design, project detailed design, design construction guidance, and project delivery summary.

This process comprehensively exercises and enhances students' occupational adaptability, employability, practical ability, innovation and entrepreneurship, and communication skills. Students receive professional feedback in the simulated environment, facilitating the internalization of knowledge and skill enhancement. The implementation of this teaching method is expected to significantly improve students' professional skills. By participating in simulated projects, students will exercise their design capabilities from conception to execution and final. These practical activities not only deepen students' understanding of environmental design theories and methods but also enhance their practical operational skills in material selection, construction management, and cost estimation. Moreover, the simulated company teaching method will strengthen students' teamwork and communication abilities as they collaborate with peers to complete design tasks, learning to leverage their strengths, coordinate differing opinions, and effectively express their design intentions. As the simulated company teaching method is further applied, students will face workplace challenges with greater confidence, possessing stronger employability and career development potential.

This teaching method helps students adapt to the ever-changing industry demands, demonstrating higher innovation and adaptability. In summary, the simulated

company teaching method not only provides students with a platform for practice and innovation but also lays a solid foundation for their career development. Through this teaching method, students can comprehensively enhance their professional skills, teamwork abilities, and communication skills in a safe and challenging learning environment, fully preparing them for their future careers.

3.2 Suggestions for Future Research

This study, focusing on the development of a simulated company curriculum model, selected representative environmental design students as research subjects and explored the development of a teaching model for enhancing the work capabilities of college students majoring in environmental design through various research methods, including interviews and questionnaires. The study provides new insights into the development of simulated companies and the cultivation of college students' capabilities. However, due to limitations in time, conditions, and capabilities, the study has some shortcomings, specifically in the following two aspects:

(1) Limitations of the Research Sample:

The samples selected in this study mainly come from environmental design students in Xinxiang, Henan, China. Although these samples have a certain degree of local representativeness, the representativeness of the samples still needs to be expanded. This limits the generalizability of the research findings and may also affect the in-depth understanding of different student characteristics. To enhance the representativeness and external validity of the study, future research should consider expanding the sample scope to include student groups from different regions and backgrounds.

(2) Depth and Breadth of Research Methods:

Although this study adopted a mixed-methods research design and used various research methods such as interviews and questionnaires, there is still room for improvement in the depth and breadth of the methods. Future research may need to combine more methods, such as observation, case study, or experimental design, to obtain more comprehensive and in-depth data. For example, case study methods could

be used to deeply analyze the learning process and outcomes of individual students or groups, or experimental designs could be employed to test the specific impact of different teaching models on students' capability development. At the same time, future research should also explore the application effects of the simulated company teaching method in different educational environments and how to adjust and optimize it according to the characteristics of different educational environments to maximize teaching effectiveness. By recognizing and addressing these limitations, future research will be able to more effectively advance the development of teaching models for environmental design majors, provide more comprehensive and personalized capability development programs for students, and thus improve educational quality, meet industry needs, and cultivate more competitive environmental design professionals.

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APPENDIX

Determining the Reliability (IOC) Test for Questionnaires

IOC (Item-Objective Congruence) refers to the Item Objective Congruence Indicator System, established by Rovinelli and Hambleton for evaluating the development phase of a project, whose main purpose is to provide a mathematized extension model applicable to multidimensional metrics and a common set of test theoretical procedures for development. In research and test development, IOC can be applied to test the reliability and validity assessment of questionnaires to help researchers derive a more objective and comprehensive evaluation from questionnaires. In addition, IOC analysis can be used to quantify the agreement between reading test questions and cognitive processing, providing quantitative data for content validity. Thus, the validity of the data is assessed in relation to the rigor and appropriateness of the process.

IOC analysis is a process whereby an expert's IOC value is derived from an expert's review of the research questionnaire, which is the accuracy value of the questionnaire. Depending on the question in question, the expert rates the extent to which individual topics agree or disagree with the specific objectives listed by the test developer.

1.score +1 if you are sure that the question was measured against the objectives.

2. Score 0 if you are unsure if the question was measured against the objectives.

3. Score -1 if you are certain that the issue being tested did not meet the objectives.

The IOC index is calculated by the formula:

$$\mathbf{IOC} = \frac{\sum \mathbf{R}}{\mathbf{N}}$$

IOC = consistency of objectives and test methods.

$\sum$R=Total number of expert review scores.

N= Total number of experts.

Criteria.

1. questions with an IOC value of 0.50-1.00 have an accuracy value that can be used.

2. questions with IOC values below 0.50 must be improved and cannot be used.

IOC Results of the Questionnaire

This analysis will comprehensively evaluate the questionnaire on the current status of the courses offered and the future courses to be conducted on the "Simulation Company" pedagogy for environmental design students at Xinxiang University in Henan Province, China. The results of the study will be scientific and rigorous.

PROJECTS FOR WHICH COMMENTS ARE SOUGHT		RATING BY EXPERTS (Composed of 5 experts)					IOC AVERAGE	REMARKS
		1	2	3	4	5		
PART I. BASIC PERSONAL INFORMATION OF THE RESPONDENT								
1	Gender	+1	+1	+1	+1	+1	1	Accepted
2	Grade level	0	+1	+1	+1	+1	0.8	Accepted
3	Age	+1	+1	+1	+1	+1	1	Accepted
4	Where do you come from?	+1	+1	+1	+1	+1	1	Accepted
5	Are you a student of the university inXinxiang?	+1	+1	+1	+1	+1	1	Accepted
6	What is your major?	+1	+1	+1	+1	0	0.8	Accepted
PART II. CONTENTS OF THE QUESTIONNAIRE This section captures questions about students' propensity to be employed for data analysis purposes.								
7	Will you choose to stay and work in Henan in the future?	+1	+1	+1	+1	+1	1	Accepted
8	What are the reasons for choosing to leave Xinxiang, Henan Province to work in other cities?	+1	+1	+1	+1	+1	1	Accepted
9	How many times have you participated in internships for environmental design majors?	+1	+1	+1	+1	+1	1	Accepted
10	What kind of problems have you encountered in the work of environmental design majors?	+1	+1	+1	+1	+1	1	Accepted
11	What do you think is the main career direction for graduates of the Environmental Design program?	+1	+1	+1	+1	+1	1	Accepted
12	What are your concerns about future employment?	+1	+1	+1	+1	+1	1	Accepted
13	What abilities do you think the simulated company program has improved?	+1	+1	+1	+1	0	0.8	Accepted
14	In what ways would you like to see the simulated company Program improve the current professional curriculum?	+1	+1	+1	+1	+1	1	Accepted

PROJECTS FOR WHICH COMMENTS ARE SOUGHT		RATING BY EXPERTS (Composed of 5 experts)					IOC AVERAGE	REMARKS
		1	2	3	4	5		
Part III A study related to the current state of the environmental design program students' perception of the current curriculum and their needs for future programs								
1.ATTITUDES TOWARDS THE ENVIRONMENTAL DESIGN PROFESSION								
1	You are interested in the Environmental Design program.	+1	+1	+1	+1	+1	1	Accepted
2	You believe the Environmental Design program is important to your career development.	+1	0	+1	+1	+1	0.8	Accepted
3	You think it is important to include courses in your current program that improve your work skills and job competitiveness.	+1	0	+1	+1	+1	0.8	Accepted
4	You will consider a career related to environmental design after graduation.	+1	+1	+1	+1	+1	1	Accepted
2.ATTITUDES TOWARDS THE CURRENT STATE OF TEACHING AND LEARNING IN THE CURRICULUM								
1	You are more satisfied with the teaching content and arrangement of the environmental design program.	+1	0	+1	+1	+1	0.8	Accepted
2	You think the current curriculum of the environmental design major is difficult.	+1	0	+1	+1	+1	0.8	Accepted
3	You often cover the contents related to the development trend of the industry in the course of study.	+1	+1	+1	+1	+1	1	Accepted
4	You think the assessment methods of the environmental design major course are reasonable.	+1	0	+1	+1	+1	0.8	Accepted
3.KNOWLEDGE OF DEVELOPMENTS IN THE ENVIRONMENTAL DESIGN INDUSTRY								
1	You are familiar with the environmental design industry.	+1	+1	+1	+1	+1	1	Accepted
2	You think the development trend of the environmental design industry is favorable.	+1	0	+1	+1	+1	0.8	Accepted
3	You believe that working as an environmental designer requires professional adaptability, innovation and entrepreneurial skills.	+1	+1	+1	+1	+1	1	Accepted
4	You are aware of the latest technologies and tools in the environmental design industry.	+1	+1	+1	+1	+1	1	Accepted

PROJECTS FOR WHICH COMMENTS ARE SOUGHT		RATING BY EXPERTS (Composed of 5 experts)					IOC AVERAGE	REMARKS
		1	2	3	4	5		
4.ATTITUDES AND EXPECTATIONS OF THE MODEL COMPANY PROGRAM								
1	You are interested in conducting the SC course in the Environmental Design program.	+1	+1	+1	+1	+1	1	Accepted
2	You are willing to participate in the SC program if it is offered.	+1	+1	+1	+1	+1	1	Accepted
3	You believe that the SC course can improve your professional ability.	+1	+1	+1	+1	+1	1	Accepted
4	You will like to see the SC program co-taught by industry experts from outside the university.	+1	+1	+1	+1	+1	1	Accepted
5.COMPETENCES TO BE CULTIVATED BY STUDENTS TO ADAPT TO THE JOB REQUIREMENTS OF ENTERPRISE								
1	You consider yourself to be quicker to adapt and be effective in a new work environment.	+1	+1	+1	0	+1	0.8	Accepted
2	You believe you have a high potential for career advancement in your area of specialization.	+1	+1	+1	0	+1	0.8	Accepted
3	You believe you have a high ability to learn new skills quickly in different work environments.	+1	+1	0	+1	+1	0.8	Accepted
4	You feel that your professional knowledge and skills meet the needs of the current job market.	+1	+1	+1	+1	+1	1	Accepted
5	You feel that your ability to demonstrate your personal strengths and specialties in the job search process is good.	+1	+1	+1	0	+1	0.8	Accepted
6	You feel that your ability to identify market opportunities and turn them into business proposals is strong.	+1	+1	+1	+1	+1	1	Accepted
7	You usually act as an idea provider in team projects and are able to drive innovative ideas forward.	+1	+1	+1	0	+1	0.8	Accepted
8	You consider your ability to apply theoretical knowledge to solve practical problems to be good.	+1	+1	+1	0	+1	0.8	Accepted
9	You feel that you have a strong ability to adapt and solve problems when encountered in practice.	+1	+1	+1	+1	+1	1	Accepted

PROJECTS FOR WHICH COMMENTS ARE SOUGHT		RATING BY EXPERTS (Composed of 5 experts)					IOC AVERAGE	REMARKS
		1	2	3	4	5		
5.COMPETENCES TO BE CULTIVATED BY STUDENTS TO ADAPT TO THE JOB REQUIREMENTS OF ENTERPRISE								
10	You are able to handle disagreements or conflicts within a team appropriately, avoiding conflicts from being triggered.	+1	+1	0	+1	0	0.6	Accepted
11	You feel you do a better job of understanding the perspectives and needs of others.	+1	+1	+1	+1	+1	1	Accepted
12	You consider yourself to be good at coordinating resources and assigning tasks in team projects	+1	+1	+1	+1	+1	1	Accepted
13	You are good at creating and adhering to project timelines and managing project budgets.	+1	+1	0	+1	0	0.6	Accepted
14	You can handle project risk identification and response better.	+1	+1	0	+1	+1	0.8	Accepted
15	You are better at summarizing and evaluating at the end of a project.	+1	+1	+1	+1	+1	1	Accepted
6.SURVEY RELATED TO THE DESIGN OF THE "SIMULATION COMPANY" COURSE								
1	The course will be more effective if the content match the employment needs of the environmental design program.	+1	+1	+1	+1	+1	1	Accepted
2	You feel that the SC course will enhance your knowledge and understanding of the environmental design industry.	+1	+1	+1	+1	+1	1	Accepted
3	Your experience will be better if the course include a teamwork component.	+1	+1	0	+1	+1	0.8	Accepted
4	It will have been more helpful if the instructor has designed the course in a way that is effective.	+1	+1	+1	+1	0	0.8	Accepted
5	You will be more satisfied if the instructor provide timely and effective feedback and guidance to students.	+1	+1	+1	+1	+1	1	Accepted
6	You will be more satisfied if the teaching schedule and time arrangement of the course are reasonable.	+1	+1	+1	+1	0	0.8	Accepted
7	If the resources of the course, such as guidance from industry experts and seminars are added, the teaching effect will be better.	+1	+1	+1	+1	+1	1	Accepted

PROJECTS FOR WHICH COMMENTS ARE SOUGHT		RATING BY EXPERTS (Composed of 5 experts)					IOC AVERAGE	REMARKS
		1	2	3	4	5		
Part IV. Specific needs of students for the development of future "simulation company" courses								
1	You will be more satisfied if the SC program used real design case studies.	+1	+1	+1	+1	+1	1	Accepted
2	You will be more satisfied if the SC program is taught in grades 3-4.	+1	+1	+1	+1	0	0.8	Accepted
3	You will be more satisfied if the SC syllabus is designed to mimic the flow of a real business project.	+1	+1	+1	+1	0	0.8	Accepted
4	You will be more satisfied if the SC program include real interaction with clients.	+1	0	+1	+1	0	0.6	Accepted
5	You will be more satisfied if the course involves more hands-on activities, field trips and simulation projects.	+1	+1	+1	+1	+1	1	Accepted
6	You will find the SC program useful for your career adaptability and employ ability.	+1	+1	+1	+1	+1	1	Accepted
7	You think that the SC program has improved your career adaptability, employ ability, innovation and entrepreneurship, and practical skills.	+1	+1	0	+1	0	0.6	Accepted
8	You believe that the SC program has increased your self-confidence and self-efficacy at work.	+1	+1	+1	+1	0	0.8	Accepted
9	You will be willing to participate in the SC program if it help you improve your work skills.	+1	+1	+1	+1	+1	1	Accepted
10	If the SC course are offered, will you recommend it to other students?	+1	+1	+1	+1	+1	1	Accepted

Forms for the Research Questionnaire Program (IOC) Specialized Lists

研究问卷方案(IOC)专名单表格

	NAME	ORGANIZATION	POSITION	PROFESSIONAL BACKGROUND	MAIN TEACHING/RESEARCH/WORK ORIENTATIONS
1	Pang Yingying	Henan Normal University	Dean of Faculty	Environmental Design	Education administrators
2	Chen Xiao	Xinxiang University	Associate Professor	Environmental Design	Education administrators
3	Zhang Gongqiang	Henan University of Science and Technology	Associate Professor	Environmental Design	Experienced teaching specialists
4	Zhao Ziqi	Xinxiang Institute of Engineering	Senior Lecturer	Environmental Design	Experienced teaching specialists
5	Duan Jingpeng	Henan Leya Interior Design Co.	CEO	Environmental Design	Industry-related experts

During the process of Item-Objective Congruence (IOC) analysis, after synthesizing the ratings from five experts, we found that 4 items had an IOC index of 0.6. Given that this score is at a critical threshold, the research team decided to revise these items to enhance their consistency with the research objectives and provide a more solid foundation for subsequent studies. The specific details of the revisions and related data are shown in the table below.

Question No.	The original question	IOC score	Summary of expert opinions	Reasons for revision	Revised issues	Revised IOC scores	Remarks
Part III 5-10	You are able to handle disagreements or conflicts within a team appropriately, avoiding conflicts from being triggered.	0.6	Expert 3: The question should be phrased as a rhetorical question. Expert 5: Statements should be as simple as possible.	Lack of clarity in the formulation of the question	Do you have the ability to appropriately handle disagreements or conflicts within your team?	1	Accepted
Part III 5-13	You are good at creating and adhering to project timelines and managing project budgets.	0.6	Expert 3: The question should be phrased as a rhetorical question. Expert 5: The statement should be clear and unambiguous.	Lack of clarity in the formulation of the question	How competent do you consider yourself, in terms of developing and adhering to project timelines and managing project budgets?	1	Accepted
Part IV-4	You will be more satisfied if the Mock Company program include real interaction with clients.	0.6	Expert 3: The question should be phrased as a rhetorical question. Expert 5: Statements should be as simple as possible.	Lack of clarity in the formulation of the question	Would you consider it better to offer a simulated company course program that includes a real interaction component with customers?	1	Accepted
Part IV-7	You think that the SC program has improved your career adaptability, employ ability, innovation and entrepreneurship, and practical skills.	0.6	Expert 3: The question should be phrased as a rhetorical question. Expert 5: Statements should be as simple as possible.	Vague formulation of the question	Do you think the SC program will improve your career adaptability, employ ability, innovation and entrepreneurship, and practical skills?	1	Accepted

Questionnaire Survey on "Simulation Company" Teaching Method for Environmental Design Majors in Xinxiang Colleges and Universities, Henan Province, China

Dear students:

Greetings! Thank you very much for taking time out of your busy schedule to complete this questionnaire. This questionnaire has been designed to better understand your views on the environmental design profession and the "Simulation Company" pedagogy course.

1. The purpose of this study is to develop a teaching model based on the simulation company in order to improve the working ability of environmental design students in Xinxiang City, Henan Province.

2.This questionnaire was designed for students majoring in environmental design in colleges and universities in Xinxiang City, Henan Province.The questionnaire was divided into four parts:.

Part I: respondents' basic personal information

Part 2: Respondents' views on the improvement suggestions of the simulation company course, ability enhancement, career direction and concerns, as well as internship experience and workplace selection.

Part III: Survey of environmental design students' current status of current courses and their needs for future courses

Part IV: Students' specific needs for the future development of the "Simulation Company" course.

3. Please answer the questionnaire as completely as possible in order to collect information.

4. Please read the definitions before completing the questionnaire to understand the specific terms and to facilitate your answers.

5. The data provided in this questionnaire is for research purposes only. The data will be analyse in a holistic manner and therefore will not have any impact on the respondents.

Definition of Specific Words:

The Simulated Company (SC) methodology, also known as SC, is an innovative approach to teaching and learning that incorporates the simulation of real business environments and workflows in an effort to bridge the gap between education and the needs of the industry and marketplace. By placing students in simulated business or organizational situations, they can gain hands-on experience with teamwork, project management, and other critical skills needed in a real work environment. Your input is vital for us to improve our programs and enhance the quality of teaching and learning. We hope to be able to get a true picture of the situation through interviews with you. The content of the interview will be kept strictly confidential and will be used for academic research only. If you are interested in the results of this research, we can share them with you later.

The researchers would like you to collaborate with us in answering the questionnaire and applying the results of the research to the development of a simulation company course model for environmental design students. We would be grateful if you could do so in order to improve the students' working skills. The researcher would like to thank you for taking this opportunity to return the questionnaires that you have answered to the researcher.

Part I Basic Personal Information (Single Choice Questions)

1. Gender:

☐Male

☐Female

2. Grade level:

☐Grade 1

☐Grade 2

☐Grade 3

☐Grade 4

3. Age

☐18-19 years old

☐20-22 years old

☐23-25 years old

☐26 years old and above

4. Where do you come from?

☐In Henan Province

☐Xinxiang City, Henan Province
☐Other provinces
☐Other countries

5. Are you a student of the university in Xinxiang?
☐Henan Institute of Science and Technology
☐Henan Normal University
☐Henan Institute of Technology
☐Xinxiang Institute of Technology

6. What is your major?
☐Environmental Design
☐Other majors

Part II. Contents of the questionnaire

7. Will you choose to stay and work in Henan in the future?
☐Not at all
☐No
☐Maybe
☐Maybe
☐Will
☐Will definitely

8. What are the reasons for choosing to leave Xinxiang, Henan Province to work in other cities?
☐Career opportunities
☐Industry development
☐Salary level
☐Educational resources
☐Quality of life
☐Other

9. How many times have you participated in internships for environmental design majors?
☐No
☐1-2 times
☐3-4 times
☐5 times or more

10. What kind of problems have you encountered in the work of environmental design majors?
☐Professional skills
☐Teamwork
☐Communication
☐Problem solving
☐Time management
☐Other

11. What do you think is the main career direction for graduates of the Environmental Design program?

☐Interior Design
☐Landscape Design
☐Architectural Design
☐Architectural design
☐Education and research
☐Freelance
☐Other

12. What are your concerns about future employment?

☐Lack of professional skills
☐Lack of practical experience
☐Fierce competition in the industry
☐Unclear career development path
☐Other

13. What abilities do you think the simulated company program has improved?

☐Career adaptability
☐Employ ability
☐Innovation and entrepreneurship
☐Practical ability
☐Communication and coordination skills
☐Project Management and Leadership
☐Other

14. In what ways would you like to see the Mock Company Program improve the current professional curriculum?

☐Course content
☐Teaching interaction
☐Practical aspects
☐Evaluation system
☐Other

Part III A study related to the current state of the environmental design program students' perception of the current curriculum and their needs for future programs

For each statement in the table below, please put a "V" on the corresponding figure for the current stage of the environmental design course status quo and the future opening of the course to develop your own actual needs, where 1=strongly disagree, 2=disagree, 3=general, 4=agree, 5=strongly agree.

	QUESTION	RATING LEVELS									
		LEVEL OF ACHIEVEMENT OF EXISTING COURSES OFFERED					DEGREE OF DEMAND FOR THE DEVELOPMENT OF UNFINISHED COURSES				
		5	4	3	2	1	5	4	3	2	1
DIMENSION1: ATTITUDES TOWARDS THE ENVIRONMENTAL DESIGN PROFESSION											
1	You are interested in the Environmental Design program.										
2	You believe the Environmental Design program is important to your career development.										
3	You think it is important to include courses in your current program that improve your work skills and job competitiveness.										
4	You will consider a career related to environmental design after graduation.										
DIMENSION2: ATTITUDES TOWARDS THE CURRENT STATE OF TEACHING AND LEARNING IN THE CURRICULUM											
1	You are more satisfied with the teaching content and arrangement of the environmental design program.										
2	You think the current curriculum of the environmental design major is difficult.										
3	You often cover the contents related to the development trend of the industry in the course of study.										
4	You think the assessment methods of the environmental design major course are reasonable.										
DIMENSION3: KNOWLEDGE OF DEVELOPMENTS IN THE ENVIRONMENTAL DESIGN INDUSTRY											
1	You are familiar with the environmental design industry.										
2	You think the development trend of the environmental design industry is favorable.										

	QUESTION	RATING LEVELS									
		LEVEL OF ACHIEVEMENT OF EXISTING COURSES OFFERED					DEGREE OF DEMAND FOR THE DEVELOPMENT OF UNFINISHED COURSES				
		5	4	3	2	1	5	4	3	2	1
3	You believe that working as an environmental designer requires professional adaptability, innovation and entrepreneurial skills.										
4	You are aware of the latest technologies and tools in the environmental design industry.										
DIMENSION4：ATTITUDES AND EXPECTATIONS OF THE MODEL COMPANY PROGRAM											
1	You are interested in conducting the SC course in the Environmental Design program.										
2	You are willing to participate in the SC program if it is offered.										
3	You believe that the SC course can improve your professional ability.										
4	You will like to see the SC program co-taught by industry experts from outside the university.										
DIMENSION5：COMPETENCIES TO BE CULTIVATED BY STUDENTS TO ADAPT TO THE JOB REQUIREMENTS OF ENTERPRISES											
1	You consider yourself to be quicker to adapt and be effective in a new work environment.										
2	You believe you have a high potential for career advancement in your area of specialization.										
3	You believe you have a high ability to learn new skills quickly in different work environments.										
4	You feel that your professional knowledge and skills meet the needs of the current job market.										
5	You feel that your ability to demonstrate your personal strengths and specialties in the job search process is good.										
6	You feel that your ability to identify market opportunities and turn them into business proposals is strong.										
7	You usually act as an idea provider in team projects and are able to drive innovative ideas forward.										
8	You consider your ability to apply theoretical knowledge to solve practical problems to be good.										

	QUESTION	RATING LEVELS									
		LEVEL OF ACHIEVEMENT OF EXISTING COURSES OFFERED					DEGREE OF DEMAND FOR THE DEVELOPMENT OF UNFINISHED COURSES				
		5	4	3	2	1	5	4	3	2	1
9	You feel that you have a strong ability to adapt and solve problems when encountered in practice.										
10	Do you have the ability to appropriately handle disagreements or conflicts within your team?										
11	You feel you do a better job of understanding the perspectives and needs of others.										
12	You consider yourself to be good at coordinating resources and assigning tasks in team projects.										
13	How competent do you consider yourself, in terms of developing and adhering to project timelines and managing project budgets?										
14	You can handle project risk identification and response better.										
15	You are better at summarizing and evaluating at the end of a project.										
DIMENSION6: SURVEY RELATED TO THE DESIGN OF THE "SIMULATION COMPANY" COURSE											
1	The course will be more effective if the content match the employment needs of the environmental design program.										
2	You feel that the Mock-Up course will enhance your knowledge and understanding of the environmental design industry.										
3	Your experience will be better if the course include a teamwork component.										
4	It will have been more helpful if the instructor has designed the course in a way that is effective.										
5	You will be more satisfied if the instructor provide timely and effective feedback and guidance to students.										
6	You will be more satisfied if the teaching schedule and time arrangement of the course are reasonable.										
7	If the resources of the course, such as guidance from industry experts and seminars are added, the teaching effect will be better.										

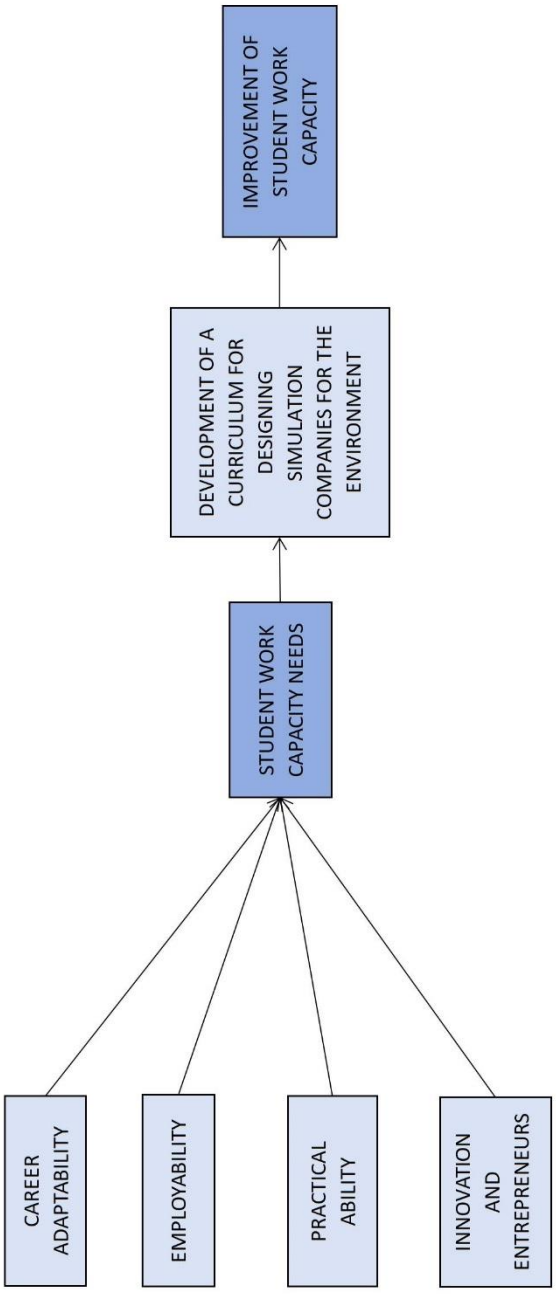
Part IV. Specific needs of students for the development of future "simulation company" courses

For each of the statements in the table below, please indicate how you feel about the future needs of the future Analog Inc. curriculum. Tick the appropriate number, 1=strongly disagree, 2=disagree, 3=fairly agree, 4=agree, 5=strongly agree.

	QUESTION	NOT NEEDED AT ALL	NOT NEEDED	GENERAL	REQUIRED	VERY NECESSARY
1	You will be more satisfied if the SC program used real design case studies.	1	2	3	4	5
2	You will be more satisfied if the SC program is taught in grades 3-4.	1	2	3	4	5
3	You will be more satisfied if the SC syllabus is designed to mimic the flow of a real business project.	1	2	3	4	5
4	Would you consider it better to offer a simulated company course program that includes a real interaction component with customers?	1	2	3	4	5
5	You will be more satisfied if the course involve more hands-on activities, field trips and simulation projects.	1	2	3	4	5
6	You will find the SC program useful for your career adaptability and employ ability.	1	2	3	4	5
7	Do you think the SC program will improve your career adaptability, employ ability, innovation and entrepreneurship, and practical skills?	1	2	3	4	5
8	You believe that the SC program has increased your self-confidence and self-efficacy at work.	1	2	3	4	5
9	You will be willing to participate in the SC program if it help you improve your work skills.	1	2	3	4	5
10	If the SC course are offered, will you recommend it to other students?	1	2	3	4	5

Thank you for your participation and valuable comments. We will continue to improve the program based on your feedback to better serve the learning and career development of environmental design students.

Questionnaire Modelling:



Interview outline on the course of "simulation company" teaching method for environmental design majors in Xinxiang University, Henan Province, China

Subject: Design firm managers and Famous designers

Dear Design Firm Managers:

I am Yajun Zhao, I am a PhD student of Sritharinwat University, Thailand, and I am writing my doctoral thesis entitled "DEVELOPING A TEACHING MODEL BASED ON A SIMULATION COMPANY IN ORDER TO IMPROVE THE WORKING ABILITY OF ENVIRONMENTAL DESIGN STUDENTS IN XINXIANG CITY, HENAN PROVINCE, CHINA". Thank you for accepting my invitation for an interview. Your experiences and perspectives are very important to my research.

The "Simulated Company" pedagogy, also known as SC, incorporates simulated real business environments and workflows into an innovative approach to teaching and learning that aims to bridge the gap between education and industry market needs. By placing students in simulated business or organizational situations, they gain hands-on experience with teamwork, project management, and other critical skills needed in a real work environment.

As a design firm principal, your hands-on experience in the industry will provide us with valuable insights that will help us better design and adapt our teaching programs to produce professionals who meet market needs. In the following interview, we will discuss topics related to the needs of enterprises, talent development and the "simulated company" teaching method. The interview is expected to last 20-40 minutes, and we hope to learn the real situation through the interview with you. The content of the interview will be kept strictly confidential and will be used for academic research only. If you are interested in the results of this research, we can share them with you later. We are looking forward to in-depth communication with you to promote the better combination of university education and enterprise needs.

In addition, in order to ensure the completeness and accuracy of the information, please allow us to record this interview, thank you again for your support and participation!

Interview Transcript Form (Design Firm Managers)

NAME OF INTERVIEWER		RECORDING AND GROUP PHOTO	
WORK UNIT		INTERVIEW TIME	
YEARS OF SERVICE		MAJORS STUDIED	
HIGHEST DEGREE		PLACE OF INTERVIEW	

1. What do you think is the development prospect and future development trend of the environmental design industry?
2. What do you think is the most important thing that designers specializing in environmental design need to improve in terms of working ability?
3. What abilities do you think are the most important for the career development of designers specializing in environmental design?
4. What are the recruitment criteria for environmental design professionals in your design company? In the process of recruitment, what are the most urgent skills or abilities of environmental design professionals?
5. Do you think that college students majoring in environmental design (meaning those who have not received any pre-service training) can immediately adapt to the design work of your company? If not, what problems and challenges might they face?
6. Do you believe that new employees need to receive pre-employment training? How long does it usually take to get them up and running?
7. How do you think the curriculum of environmental design programs in colleges and universities should be designed to better meet the needs of enterprises and keep up with the development trend of the design market? Meanwhile, what do you suggest to cultivate students' practical ability and working ability?
8. If the "Simulated Company Teaching Method" program is started in the environmental design courses of colleges and universities, and the students can master certain working ability in the process, will you give priority to hiring them? Compared to students who have not received any pre-employment training, what advantages do you think they have in talent selection?
9. Would your firm be willing to participate in a university-university partnership to train a new generation of environmental design professionals, and to promote innovation and economic benefits for the industry?
10. If your company and the environmental design program of the university jointly carry out the "simulation company teaching method" project training and learning, in what way are you willing to participate? What are your requirements for participation?

Interview outline on the course of "simulation company" teaching method for environmental design majors in Xinxiang University, Henan Province, China

Target: Experts and teachers of environmental design teaching

Dear Environmental Design Teaching Experts:

Hello! I am Yajun Zhao, I am a PhD student of Sritharinwat University, Thailand, and I am writing my doctoral thesis entitled "DEVELOPING A TEACHING MODEL BASED ON A SIMULATION COMPANY IN ORDER TO IMPROVE THE WORKING ABILITY OF ENVIRONMENTAL DESIGN STUDENTS IN XINXIANG CITY, HENAN PROVINCE, CHINA". Thank you for accepting my invitation for an interview. Your experiences and perspectives are very important to my research.

The "Simulated Company" pedagogy, also known as SC, incorporates simulated real business environments and workflows into an innovative approach to teaching and learning that aims to bridge the gap between education and industry market needs. By placing students in simulated business or organizational situations, they gain hands-on experience with teamwork, project management, and other critical skills needed in a real work environment.

As an expert in teaching environmental design and as a teacher, your experience in teaching environmental design over the years will provide me with valuable insights that will help me better design and adjust the teaching of the program to produce professionals who meet the market needs and increase the employability and workability of students. In the following interview, we will discuss issues related to student employment, talent development and the "simulated company" teaching method. The interview is expected to last 20-40 minutes, and we hope that we will be able to get a true picture of the situation through the interview with you. We will keep the content of the interview strictly confidential and use it for academic research only. If you are interested in the results of this research, we can share them with you later. We are looking forward to an in-depth exchange with you to promote a better combination of university education and enterprise needs, in order to clarify the issues related to student employment.

In addition, to ensure the completeness and accuracy of the information, please allow us to record this interview, and thank you again for your support and participation!

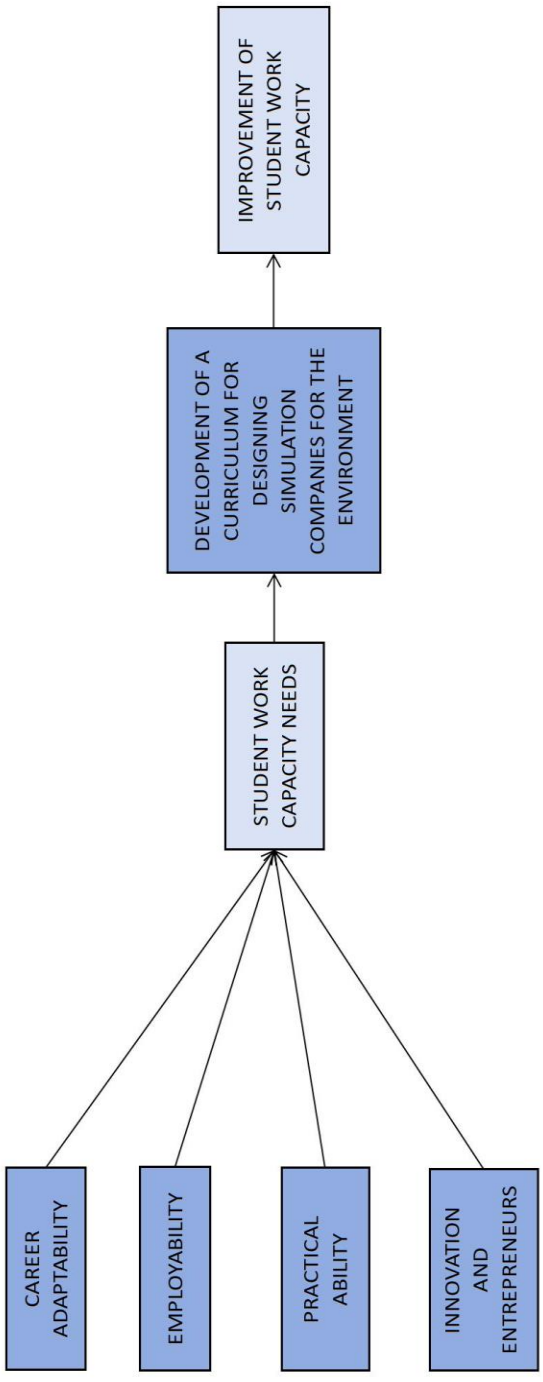
The following is the outline of the interview:

INTERVIEW TRANSCRIPT FORM (EXPERTS AND TEACHERS OF ENVIRONMENTAL DESIGN TEACHING)

Name		Highest Academic Degree	
organization		Graduate School	
Title		Specialty	
Position		Major Courses Taught	

1. Do you have practical experience in environmental design projects?
2. Do you think the teaching plan and curriculum arrangement of the environmental design major in your school are reasonable?
3. Do you think the teaching plan and curriculum arrangement of the environmental design major in your school are reasonable?
4. How is the existing practice program of environmental design in your school?
5. What positions do graduates of the environmental design major in your school usually take up, and what is the employment rate of the students?
6. Do you think that the teaching curriculum design of your school's environmental design program closely corresponds to the talents demanded by the current design market? What are the problems?
7. Do you know the teaching method of "simulation company" and to what extent?
8. What kind of influence do you think the "Simulation Company" teaching method can have on students in the environmental design majors of colleges and universities? Which grade do you suggest to start this program and why?
9. What do you think should be the core content and teaching objectives of the "Simulation Company" pedagogy in the environmental design program of Xinxiang University in Henan Province?
10. What do you think are the main challenges that might be faced in implementing the "Model Company" pedagogy in the environmental design program? What are your solutions? Would you like to replicate and apply this approach in your school?

Questionnaire Modelling:



EXPERT INTERVIEWS - LIST OF PARTICIPANT 专家访谈--与会者名单

NO	NAME	WORKPLACE	POSITION	CATEGORY
1	Zheng Guoli	Henan Erdong Architectural Decoration Design Institute	CEO	Design company managers
2	Liu Jinfeng	Henan Yonghe Architectural Decoration Engineering	CEO	
3	Yi Peng	Henan Le Jiao Design & Engineering Co.	CEO	
4	Zhou Ting	Henan Yonghe Architectural Decoration Engineering	design director	Famous designers
5	Wang Chunguang	Henan Zhuo Cheng Architectural Decoration Design Institute	design director	
6	Guao Yuan	Henan Youhua Architectural Decoration Design Co.	design director	
7	Zheng Shihua	Henan Institute of Science and Technology Environmental Design Program	Dean, Professor	Experts and teachers of environmental design teaching
8	Wang Min	Environmental Design Program, Henan Institute of Technology	vice-president (of a university etc)	
9	Shen yingying	Henan Normal University Environmental Design Program	Head of Specialty	
10	Li Man	Xinxiang College Environmental Design Program	Associate Professor	

EXPERT INTERVIEWS - LIST OF PARTICIPANT IN A SURVEY

Subject: Design firm managers and Famous designers

CLASSIFIEATION OF INTERVIEWEES	Design company managers
NAME	Zheng Guoli
WORK UNIT	Henan Erdong Architectural Decoration Design Institute
POSITION	CEO
INTERVIEW LOCATION	Henan, Xinxiang, its company
INTERVIEW TIME	40 minutes.

CLASSIFIEATION OF INTERVIEWEES	Design company managers
NAME	Liu Jinfeng
WORK UNIT	Henan Yonghe Architectural Decoration Engineering
POSITION	CEO
INTERVIEW LOCATION	Henan, Xinxiang, its company
INTERVIEW TIME	60 minutes.

EXPERT INTERVIEWS - LIST OF PARTICIPANT IN A SURVEY

Subject: Design firm managers and Famous designers

CLASSIFIEATION OF INTERVIEWEES	Design company managers
NAME	Yi Peng
WORK UNIT	Henan Le Jiao Design & Engineering Co.
POSITION	CEO
INTERVIEW LOCATION	Henan, Xinxiang, its company
INTERVIEW TIME	30 minutes.

CLASSIFIEATION OF INTERVIEWEES	Design director
NAME	Zhou Ting
WORK UNIT	Henan Yonghe Architectural Decoration Engineering Co.
POSITION	Famous designers
INTERVIEW LOCATION	Henan, Xinxiang, its company
INTERVIEW TIME	60 minutes.

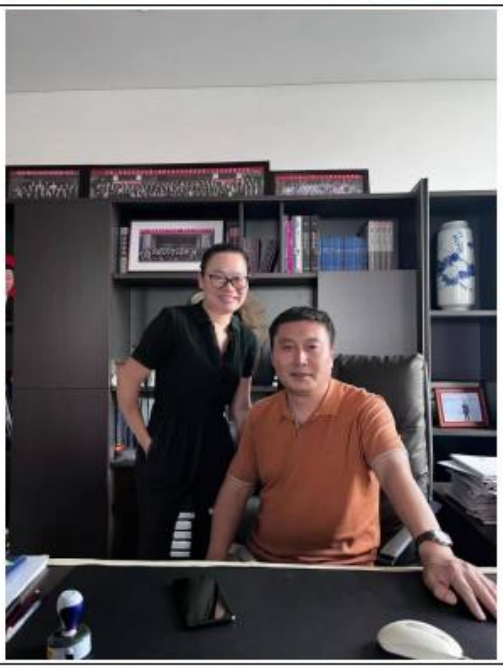
EXPERT INTERVIEWS - LIST OF PARTICIPANT IN A SURVEY **Subject: Design firm managers and Famous designers**		
CLASSIFIEATION OF INTERVIEWEES	Design director	
NAME	Wang Chunguang	
WORK UNIT	Henan Erdong Architectural Decoration Design Institute	
POSITION	Famous designers	
INTERVIEW LOCATION	Henan, Xinxiang, its company	
INTERVIEW TIME	20 minutes.	
CLASSIFIEATION OF INTERVIEWEES	Design director	
NAME	Guao Yuan	
WORK UNIT	Henan Youhua Architectural Decoration Design Co.	
POSITION	Famous designers	
INTERVIEW LOCATION	Henan, Xinxiang, its company	
INTERVIEW TIME	30 minutes	

EXPERT INTERVIEWS - LIST OF PARTICIPANT IN A SURVEY

Subject: Experts and teachers of environmental design teaching

CLASSIFIEATION OF INTERVIEWEES	Experts and teachers
NAME	Zheng Shihua
WORK UNIT	Henan Institute of Science and Technology Environmental Design Program
POSITION	Dean, Professor
INTERVIEW LOCATION	Henan, Xinxiang, its office

CLASSIFIEATION OF INTERVIEWEES	Experts and teachers
NAME	Wang Dong
WORK UNIT	Environmental Design Program, Henan Institute of Technology
POSITION	vice-president (of a university etc)
INTERVIEW LOCATION	Henan, Xinxiang, its office
INTERVIEW TIME	30 minutes.



EXPERT INTERVIEWS - LIST OF PARTICIPANT IN A SURVEY **Subject: Experts and teachers of environmental design teaching**		
CLASSIFIEATION OF INTERVIEWEES	Experts and teachers	
NAME	Shen yingying	
WORK UNIT	Henan Normal University Environmental Design Program	
POSITION	Head of Specialty	
INTERVIEW LOCATION	Henan, Xinxiang, its office	
INTERVIEW TIME	50 minutes.	
CLASSIFIEATION OF INTERVIEWEES	Experts and teachers	
NAME	Li Man	
WORK UNIT	Xinxiang College Environmental Design Program	
POSITION	Associate Professor	
INTERVIEW LOCATION	Henan, Xinxiang, its academic exchange center	
INTERVIEW TIME	30 minutes.	

FOCUS GROUP： Teaching Model Development: Applicability and Feasibility Evaluation Form										
No.	**Applicability**					**Feasibility**				
1.Name of the model	5	4	3	2	1	5	4	3	2	1
2.Diagram of 5 work competencies that environmental design students need to improve										
3: Model diagram of the 5 teaching phases of the "simulation company" teaching model										
4.Model of the support mechanism of the "Simulation Company" teaching mode										
5. A diagram of the "Simulation Company" teaching model for environmental design students (overall design scheme)										
6. Logic of the teaching model structure										
7. Components of the teaching model										
8. Research steps of the teaching model										
9. Scalability of the pedagogical model										
10. Evaluation and feedback mechanism of the teaching model										

LIST OF FOCUS GROUP PARTICIPANTS

NO	NAME	ORGANIZATION	POSITION	PROFESSIONAL BACKGROUND	MAIN TEACHING/RESEARCH/WORK ORIENTATIONS	PARTICIPATION GROUP ROLES
1	Dong Xinjian	Henan University of Science and Technology	Dean of Faculty	Urban Planning and Design	Teaching and Research in Design	Panel moderator
2	Wang Dong	Henan Normal University	Professor	Environmental Design	Project Design and Practice	Expert members
3	Zhang jing	Xinxiang Academy	Professor	Environmental Design	Practice Teaching	Panelists
4	Xu Qing	Henan University of Technology	lecturer	Environmental Design	Multidisciplinary integration	Expert members
5	LI Wenbiao	Chaowei Construction Group Co., Ltd.	CEO	Environmental Design	Architectural Design Practice	Expert members
6	Yang Hua	Henan Youhua Architectural Decoration Design Co.	CEO	Environmental Design	Architectural Design Practice	Panelists
7	Li Shen	Henan Yisu Decoration Engineering Design Co.	Design Director	Environmental Design	Project Design and Practice	Panelists

AF20-03-03.0
May, 2023

Certificate of Ethical Committee Approval

This is to certify that:

Protocol Title: DEVELOPING A TEACHING MODEL BASED ON A SIMULATION COMPANY IN ORDER TO IMPROVE THE WORKING ABILITY OF ENVIRONMENTAL DESIGN STUDENTS IN XINXIANG CITY, HENAN PROVINCE, CHINA.
Principal investigator: Mrs.YAJUN ZHAO
Institution: Faculty of Fine Arts, Srinakharinwirot University
Protocol code: SWUEC-672483
Documents approved:

1. Submission form — version no. 2 date 30 August 2024
2. Full research proposal — version no. 1 date 28 June 2024
3. Participant information sheet and consent form — version no. 2 date 30 August 2024
4. Questionnaire/data collection form — version no. 1 date 28 June 2024
5. Investigator's biography

have been reviewed and approved by the Human Research Ethics Committee of Srinakharinwirot University based on Declaration of Helsinki, Belmont Report, International Conference on Harmonization in Good Clinical Practice (ICH-GCP), International Guidelines for Human Research, along with laws and regulations of Thailand. Thus, the approval for conducting the study is granted.

Date of approval: 18/10/2024
Date of expiration: 17/10/2025

(Associate Professor Sittipong Wattananonsakul, Ph.D.)
Chairman, Social Science and Behavioral Science Research Sub-Committee
of Srinakharinwirot University (Panel 2)

Ethics and Research Standards Devision
Innovation Building Prof. Dr. Saroch Buasri, Floor 17
Srinakhanarinwirot University, 10110 Thailand
Tel.: +66-26-495000, 17503 Fax: (02) 2042590

VITA