Construction of New Engineering Talent Training Mode from the Perspective of Innovation Ecology—Optimization and Innovation Path of University and Industry Cooperation Mechanism

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Abstract: This paper takes the perspective of innovation ecology as the theoretical framework, and discusses the construction of talent training mode under the background of new engineering.Taking the application case of generative artificial intelligence as an example, the study introduces enterprise teaching resources, relying on project case experience, and drawing on the competition form of "AIGC Innovation and Creativity Competition", guides students to independently select topics, plan design schemes, and uses generative artificial intelligence technology for auxiliary design, shows the overall design process of students applying AIGC, and discusses the teaching reform path driven by artificial intelligence. With the optimization and innovation of university and industry cooperation mechanism as the breakthrough point, this paper discusses how to build a more closely and efficient industry-university cooperation mode, so as to promote the innovation and optimization of talent training mode under the background of new engineering, and provide beneficial practical experience and inspiration for university talent training.

1. Introduction

With the rapid development of information technology and the transformation and upgrading of industrial structure, new engineering education has become an important direction to adapt to the development needs of the times.New engineering education emphasizes interdisciplinary integration, practical innovation and industry-university cooperation, aiming to cultivate high-level talents with innovative spirit and practical ability. In this context, the role of university and industry cooperation in talent training is increasingly prominent.This paper aims to explore the construction of new engineering talent training mode from the perspective of innovation ecology, focusing on the application design case of generative artificial intelligence, in order to explore the innovative path of new engineering education from practice.By introducing enterprise teaching resources, learning from the experience of actual project cases and combining with the form of competition, a talent

training mode that can effectively stimulate students' innovative thinking and practical ability is constructed.To optimize and innovate the cooperation mechanism between universities and industry as the breakthrough point, this paper discusses how to build a more close and efficient industry-university cooperation mode, so as to promote the innovation and optimization of talent training mode under the background of new engineering, and provide beneficial practical experience and inspiration for the talent training of universities.Therefore, this paper has important theoretical and practical significance for promoting the development of new engineering education, improving the quality of talent training in universities, and promoting the depth and breadth of industry-university cooperation.I. Talent training concept from the perspective of innovation ecology.The perspective of innovation ecology is a theoretical framework for understanding innovation from the perspective of ecology.It believes that innovation is not only a single entity behavior, but a complex system interwoven by many participants.In this system, participants are interdependent and influence each other, and jointly build an innovation ecology. This perspective emphasizes the influence of the external environment on innovation and its complex interaction with innovation.By viewing innovation as an ecosystem, it reveals the interdependence among participants, providing a new perspective and analytical framework for understanding innovation.

2. Methodology

2.1 The concept of talent cultivation from the perspective of innovative ecology

The concept of talent cultivation from the perspective of innovation ecosystem emphasizes that talent cultivation should be placed under the overall framework of innovation ecosystem, and focuses on the integration of industry, education, scientific research and social resources in the cultivation process, so as to promote students' comprehensive growth and improvement of innovation ability.It encourages cross-border cooperation and integration in different fields, so that students can learn in diversified subject backgrounds and knowledge fields, broaden their horizons, and cultivate interdisciplinary comprehensive quality.It advocates open and inclusive cooperation mechanisms, and carries out in-depth cooperation with industries, social organizations and scientific research institutions, so as to provide students with diversified learning resources and practice platforms.It emphasizes the cultivation of students' innovative consciousness and entrepreneurial spirit, focuses on the cultivation of students' innovative thinking and practical ability, and encourages students to transform knowledge into social value through innovation and entrepreneurship practice.It builds a good ecological environment for innovation, providing students with a soil and atmosphere for innovation and entrepreneurship, and stimulating students' creativity and innovation potential.

Focus on the personalized talent training mode, which caters to students' specialties and interests, by providing a tailored learning and development pathway. This approach is designed to spark students' motivation to learn and ignite their creative passion. It aims to cultivate students with the awareness and skills necessary for lifelong learning, emphasizing their continuous learning and growth throughout all stages of life. This preparation is essential for adapting to the ever-changing social and career development challenges.

In general, the talent training concept from the perspective of innovative ecology aims to build an open and innovative talent training ecosystem, through multi-party cooperation and resource sharing, cultivate compound high-level talents with innovative spirit, practical ability and comprehensive quality, and provide strong support for social and industrial development.

2.2 The construction of talent training mode under the background of new engineering

2.2.1 The background and characteristics of new engineering

The background and characteristics of new engineering mainly involve the evolution and characteristics of engineering education. The following are some key characteristics:

(1)Interdisciplinary integration: new engineering emphasizes the cross and integration between different disciplines, breaks the boundaries of traditional disciplines, promotes the cross cooperation between engineering and other disciplines (such as humanities, social sciences, arts, etc.), and cultivates talents with cross-field comprehensive quality. Practice-oriented: New engineering education focuses on the cultivation of students' practical ability, emphasizes the importance of practical teaching and project practice, helps students master professional skills, solve practical problems, and cultivates innovative spirit and practical ability through practical activities.

(2)In-depth combination of industry and academia: New engineering education focuses on close cooperation with the industry. Through the implementation of industry-university-research cooperation projects and cooperation with enterprises, students can be immersed in the actual work scenario, familiar with the actual needs of the industry, so as to cultivate their practical operation ability.

(3)Stimulate innovation and entrepreneurship: New engineering education emphasizes the cultivation of students' innovative consciousness and entrepreneurial ability, encourages students to actively participate in innovative projects and entrepreneurial practice, and provides corresponding educational resources and support, aiming to cultivate a group of talents with both innovative spirit and entrepreneurial ability. [1]

2.2.2 Objectives and requirements for talent training

The objectives and requirements for talent training under the background of new engineering are to cultivate students into compound talents with broad disciplinary knowledge, solid professional skills and comprehensive quality. This includes the cultivation of innovation ability, practical ability, team cooperation ability and entrepreneurial consciousness, and pays attention to the development of international horizon and lifelong learning ability. In addition, it is also crucial to cultivate students' sense of social responsibility and moral quality to ensure that they can make positive contributions to society in the future engineering practice.Through these training objectives and requirements, new engineering education is committed to providing high-level talents with a broad knowledge base, practical ability and innovative spirit for the development of the country and society. [2]

3. Analysis of Design Cases for Generative Artificial Intelligence Applications

3.1 The direction of teaching reform in the context of artificial intelligence

The direction of teaching reform under the background of artificial intelligence should closely follow the trend of technological development, focus on introducing artificial intelligence technology, innovating teaching models, stimulating student interest, strengthening practical teaching, providing personalized educational services, cultivating innovative thinking, in order to promote the improvement of educational quality and the comprehensive development of student abilities. In the context of artificial intelligence, the direction of teaching reform should focus on the following aspects:

(1)Introducing artificial intelligence technology: The primary direction of teaching reform is to introduce artificial intelligence technology, utilize intelligent teaching systems, intelligent auxiliary

teaching tools, etc., to improve teaching efficiency and quality. Through intelligent technology, personalized solutions to student learning problems are provided, along with customized learning paths and resources.

(2)Exploring blended learning models: Combining online education platforms with traditional classroom teaching, exploring blended learning models to improve teaching flexibility and adaptability. By utilizing artificial intelligence technology, we can achieve complementary and interactive teaching resources both online and offline, providing students with a richer learning experience.

(3)Strengthening practical teaching: By participating in AIGC competitions that combine artificial intelligence technology, students can master relevant knowledge and skills in competition practice. For instance, we need to consider the creation of the Milan Design Week AIGC Creative Design Competition, which is centered around artificial intelligence. This competition encourages students to utilize AIGC technology and tools to address real-world issues, thereby enhancing their practical skills.

(4)Cultivating innovative thinking: Teaching reform should attach importance to cultivating students' innovative thinking and problem-solving abilities. By creating problem-oriented learning tasks, we encourage students to employ artificial intelligence technology for innovative research and exploration. This approach aims to develop their ability to solve complex problems.

3.2 Case Analysis of AIGC Innovation and Creativity Competition

The AIGC Innovation and Creativity Competition is an international innovation competition with the theme of artificial intelligence, aimed at encouraging and supporting the innovation and creativity of young students worldwide in the field of artificial intelligence. Taking the Milan Design Week AIGC Innovation and Creativity Competition as an example: Event Background and Objective: In 2023, we focus on the perfect integration of artificial intelligence and creativity. Through AIGC technology, we have entered a new era where everyone can create. In this era, everyone has the opportunity to become a creative expert in the AI era. The Milan Design Week Exhibition of Excellent Works by Chinese University Design Discipline Teachers and Students aims to create a platform for showcasing and competing with a wide range of university teachers and students, showcasing their outstanding works in the new era of AI. At the same time, we ourselves have also ushered in a brand new era that requires a unique IP image to welcome this exciting moment. Therefore, we have launched this proposition competition and sincerely invite creators to create the "AIGC Special Competition IP Image" as their creative goal. We look forward to seeing the emergence of cartoon IP designs characterized by youthfulness, fun, creativity, and intelligence, which will become the official image of the AIGC specialized arena. Once adopted, this image will have a wide exposure opportunity in multiple channels and scenarios, both online and offline. Let's create a creative and intelligent future together, bringing new vitality to the AIGC special event! As shown in Figure 1

Figure 1: Milan Design Week AIGC Innovation and Creativity Competition

Event theme and idea: Milan Design Week - Excellent Works Exhibition of Chinese University Design Discipline Teachers and Students - AIGC Creative Innovation Application Competition and "AIGC Creative Future" Cartoon IP Image Design Competition in Universities. The theme of "AIGC Creative Future" allows creators to think and interpret the forefront and breakthroughs of creativity through the following dimensions: What forms of innovation will future art and design have with the help of AI? The Integration of Technology and Creativity: How does AIGC technology interact and integrate with artistic creation? The impact of society and culture: What expressions will AIGC present at the future social and cultural level?

Review criteria and evaluation system: Commercial application value: The work needs to consider its later online and offline promotional use, with sufficient commercial application scenarios (such as WeChat emojis, figurines, and other peripheral designs). Visual expression: The main work and poster design need to reflect high aesthetics, rich details, and beautiful forms. Creative planning ability: The work needs to have a clear creative theme and storytelling, closely adhering to the core concept of the proposition. Maturity of technological application: The work needs to reflect a complete creative process and stage results presentation (process screenshots+text explanations), and encourage multi tool combination innovation.

Training and guidance: In order to improve the competition level and project quality of the participants, the platform has organized a series of training and guidance activities, including professional technical lectures, project guidance, and practical guidance. These training activities not only improved the technical level of the participants, but also enhanced their teamwork and innovation awareness. (As shown in screenshots of AIGC practical application process in Figure 2)
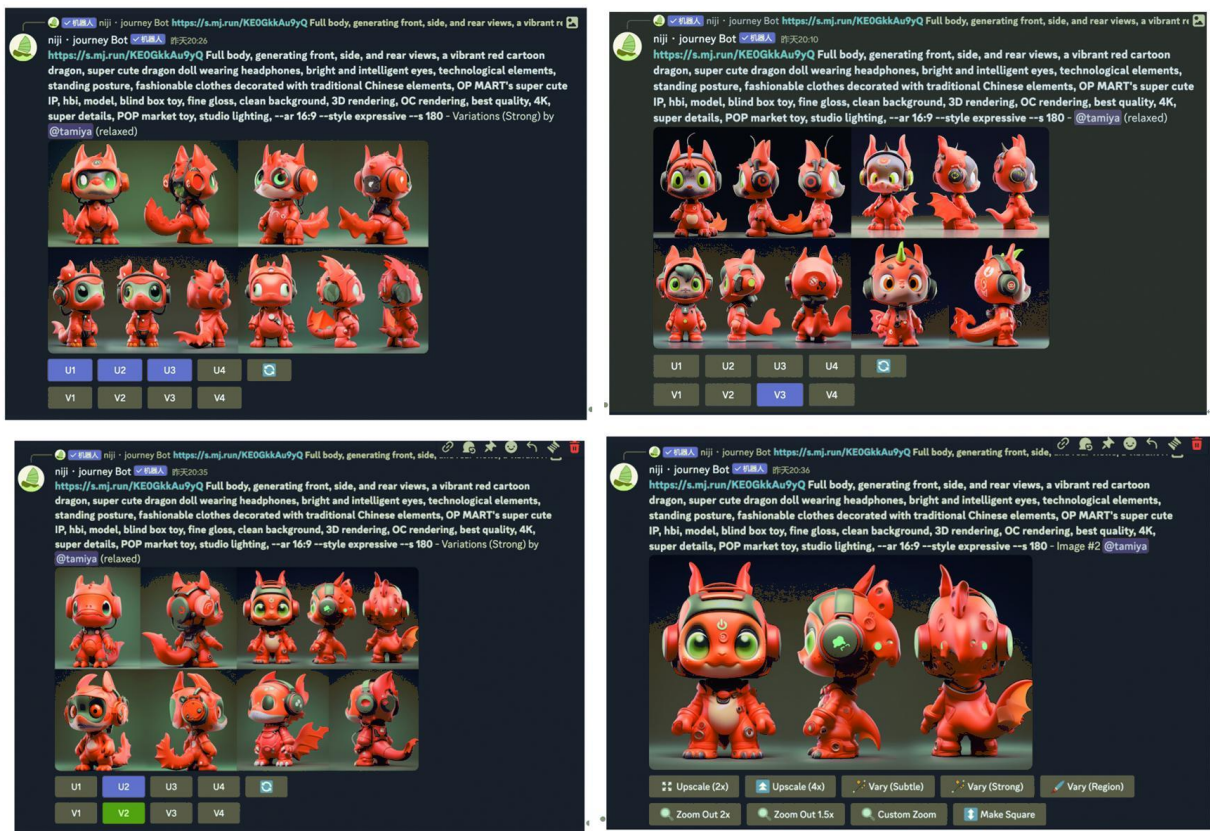

Figure 2: AIGC Practice Application Display - Screenshot of the Design Process for the Cartoon IP Image of "AIGC Creative Future"

Figure 3: AIGC Practice Application Display - Cartoon IP Image Design Poster for "AIGC Creative Future"

Achievement Display and Exchange: The AIGC Innovation and Creativity Competition provides a platform for participants to showcase their achievements and exchange experiences. Through project presentations, academic discussions, and industry academia docking, it promotes communication and cooperation among participants, and promotes technological innovation and industrial development in the field of artificial intelligence. (As shown in screenshots of AIGC practical application process in Figure 3)[4]

3.3 Application of AIGC-aided design in industry-university cooperation

Introducing enterprise teaching resources and sharing practical experience is an effective teaching reform measure, which can enrich teaching content, enhance students' practical and problem-solving abilities, promote industry university cooperation, cultivate students' innovative thinking, and promote the close combination of talent cultivation and industrial development. Introducing enterprise teaching resources and sharing practical experience is an important measure to promote teaching quality and enhance students' practical abilities. The introduction of enterprise teaching resources can add rich practical cases and industry experience to teaching content, enabling students to have a more intuitive understanding of the current development status and actual work needs of the industry. Through enterprise teaching resources, students can be exposed to the latest industry technologies and work methods, accumulate practical experience, enhance professional skills and problem-solving abilities. The introduction of enterprise teaching resources can also provide students with guidance and advice from industry experts, who can share their practical experience and guide them on how to cope with practical work challenges. By collaborating with enterprises to carry out project practice, students can gain a deeper understanding of theoretical knowledge and apply it to practical projects, thereby enhancing their practical and problem-solving abilities. The introduction of enterprise teaching resources is conducive to promoting industry university cooperation, strengthening communication and cooperation between schools and enterprises, providing students with more internship and employment opportunities, and promoting the integration of industry university research and application. By collaborating with enterprises to carry out innovative projects, students can be exposed to cutting-edge technologies and innovative concepts in the industry, stimulate innovative thinking, and cultivate innovative abilities.[5]

3.4 Application of AIGC assisted design in industry university cooperation

AIGC, also known as artificial intelligence generated content, provides strong support for designers and business partners in industry university cooperation. Through the application of AIGC, rapid prototyping design, creative stimulation, design education and training, and automated production support can be achieved, thereby promoting the smooth progress of collaborative projects and the rapid development of industrial innovation.

In terms of rapid prototyping, AIGC can quickly generate preliminary design proposals or prototypes, providing designers with more choices and possibilities. This greatly shortens the design cycle and accelerates project progress. In terms of creative stimulation and integration, AIGC can bring inspiration to designers by combining and innovating various design elements. At the same time, it can also provide diversified design solutions, allowing designers and business partners to jointly create more innovative and market competitive products or services. In addition, AIGC can also serve as a tool for design education and training, helping students and designers quickly master design skills and methods. Through the assistance of AIGC in teaching, students can continuously improve their design abilities in practice, and be fully prepared for future industrial practices. When implementing experimental projects, we chose practical projects related to artificial intelligence, such as design projects based on AIGC. We have formed an interdisciplinary team, including designers, engineers, data analysts, etc., to ensure the diversity and comprehensiveness of the project. At the same time, we have set clear project goals and plans, and designed a clear implementation process. In order to evaluate the implementation effect of the experimental project, we tracked and recorded the participation of students, including the frequency, duration, and enthusiasm for participating in the project. In addition, we also observed the performance and growth of students in the project, and evaluated their improvement in innovation ability. After the project was completed, we organized a presentation and sharing session, inviting relevant stakeholders and experts to participate. This not only showcases the innovative achievements of students, but also shares project experience and insights. Through these activities, we comprehensively evaluated the implementation and effectiveness of the experimental project, providing valuable experience and reference for future similar projects. Overall, the application of AIGC in industry university cooperation provides strong support for designers and business partners. At the same time, the implementation and evaluation of experimental projects have also promoted the improvement of students' innovative abilities and the continuous optimization and innovation of talent cultivation models.[6]

4. Conclusion

From the perspective of innovative ecology, the collaborative education model between universities and industries is characterized by deep integration of industry and academia, innovation driven, practical orientation, and open cooperation, achieving resource sharing, practical teaching, and industry orientation, and cultivating high-quality talents that meet industrial needs. This model combines knowledge and practice closely through project development and practical teaching, integrates school and industry innovation resources, cultivates innovative talents, and promotes the transformation of scientific and technological achievements and industrial upgrading. The cooperative education model promotes resource sharing and complementary advantages, improves teaching quality and research level, emphasizes practical teaching and project practice, and cultivates students' practical, innovative, and problem-solving abilities.

Guided by the needs of the industry, we design teaching content and practical projects that prepare students for future career development. An open cooperation mechanism is established to attract more enterprises to participate, promoting interaction between schools and enterprises, and

fostering win-win cooperation. Additionally, a diversified evaluation system is set up to comprehensively assess students' overall quality and abilities.This model cultivates high-quality talents, provides high-level talent output services for society, promotes socio-economic development, and provides new ideas for higher education reform and development.

References

[1] Shao Bo; Shi Jinfei. Innovation of Applied Undergraduate Talents Training Mode under the Background of New Engineering—Exploration and Practice of Nanjing Institute of Technology [J]. Higher Engineering Education Research, 2023 (3)

[2] Gu Peihua. New Engineering and New Paradigm: Practical Exploration and Thinking [J]. Higher Engineering Education Research, 2020 (04)

[3] Yan Jiahua; Li Ruihao. Artificial Intelligence-driven Teaching Mode Innovation of Ideological and Political Courses in Universities [J]. Journal of Xiangtan University (Philosophy and Social Science Edition), 2022 (05)

[4] Huang Ronghuai; Li Min; Liu Jiahao. Current Situation and Thinking of Students' Generative Artificial Intelligence Application--Based on the Survey of Zhejiang University [J]. Journal of National Institute of Education Administration, 2021 (09)

[5] Chen Yukun. Educational Reform in the Age of ChatGPT/Generative Artificial Intelligence [J]. Journal of East China Normal University (Education Science Edition), 2023 (07)

[6] Zhu Yongxin; Yang Fan. ChatGPT/Generative Artificial Intelligence and Educational Innovation: Opportunities, Challenges and Future [J]. Journal of East China Normal University (Education Science Edition), 2023 (07).