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Exploration of Graduate Student Cultivation Mode of Landscape Architecture under the Background of "Artificial Intelligence + X"

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Abstract Under the background of "artificial intelligence + X", the development of landscape architecture industry ushers in new opportunities, and professional talents need to be updated to meet the social demand. This paper analyzes the cultivation demand of landscape architecture graduate students in the context of the new era, and identifies the problems by comparing the original professional graduate training mode. The new cultivation mode of graduate students in landscape architecture is proposed, including updating the target orientation of the discipline, optimizing the teaching system, building a "dual-teacher" tutor team, and improving the "industry-university-research-utilization" integrated cultivation, so as to cultivate high-quality compound talents with disciplinary characteristics.

Keywords Artificial intelligence+, Landscape architecture, Graduate training model, Professional talent
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In recent years, artificial intelligence, big data and other technologies have been developing rapidly, and more and more industries are introducing artificial intelligence technology to promote industrial upgrading and innovation. Landscape architecture is a highly comprehensive discipline, and exploring interdisciplinary cross-fertilization can cultivate more high-level talents with comprehensive thinking, innovative spirit, practical ability, and international vision. In April 2018, the Ministry of Education issued the *Action Plan for Artificial Intelligence Innovation in Higher Education*, which supports colleges and universities to pay attention to the cross-fertilization of AI with the education of other disciplines and majors, explore the "artificial intelligence + X" talent cultivation mode, and promote the construction of first-level disciplines in the field of artificial intelligence[1]. In February 2020, the Ministry of Education, the National Development and Reform Commission and the Ministry of Finance issued *Several Opinions on Promoting Discipline Integration and Accelerating Postgraduate Cultivation in the Field of Artificial Intelligence in Colleges and Universities in the Construction of "Double First-class"*, proposing that colleges and universities in the construction of "Double First-class" should focus on building a training system that emphasizes both basic theoretical talents and "artificial intelligence + X" composite talents, exploring a new model for the construction of disciplines and the cultivation of talents that integrates deeply and making great efforts to improve the level of postgraduate cultivation in the field of artificial intelligence, so as to provide more adequate talent support for China to seize the world's scientific and technological frontiers, and realize major breakthroughs in the leading original achievements[2].

As the construction of "beautiful China" continues to promote, landscape architecture industry has a broader market and development space. The application of artificial intelligence technology will bring more opportunities for landscape architecture, but also faces many challenges. This paper analyzes the current situation of talent cultivation in landscape architecture, and improves the postgraduate cultivation mode of landscape architecture from the aspects of talent cultivation target positioning, comprehensive teaching mode, faculty construction, and teaching platform construction, which is a powerful measure to develop and reserve high-level composite talent team of "artificial intelligence + landscape architecture" in the era of artificial intelligence.

1 Exploration of graduate training needs of landscape architecture under the background of "artificial intelligence + X"

1.1 Demand for "artificial intelligence + landscape architecture" teachers and talents in colleges and universities

Artificial intelligence makes a huge shift in the mode and mechanism of talent training in institutions of higher education, and education and teaching are faced with the cross-fertilization of artificial intelligence and traditional disciplines, leading to higher requirements for teachers in institutions of higher education[3]. The *Opinions on Comprehensively Deepening the Reform of the Construction of Teachers in the New Era* issued by the CPC Central Committee and State Council clearly pointed out that teachers should take the initiative to adapt to information technology, artificial intelligence and other new technological changes, and carry out education and teaching actively and effectively[4]. Based on this, the faculty of institutions of higher education should have the relevant theoretical foundation of artificial intelligence and algorithm design capabilities, in order to offer relevant courses and guide students to carry out research on the application of relevant technologies in subject areas. Therefore, the cultivation of professional high-level talents with knowledge of artificial intelligence at postgraduate education stage in landscape architecture is forward-looking for broadening the source of faculty in colleges and universities[5].

1.2 Enterprises' demand for "artificial intelligence + landscape architecture" technical talents

Technical talent is the key force to promote technological innovation, enterprise development and industry progress. Enterprises require technical talents to have the ability to research and develop artificial intelligence technology and its application in specialized fields, including machine learning, deep learning, computer vision, etc., and apply it to intelligent design, intelligent construction, intelligent management, etc., in order to develop and apply new technologies. However, at present, industry talents capable of technological innovation and application are unable to keep up with the actual

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demand. Therefore, attaching importance to the cultivation of graduate students of "artificial intelligence + landscape architecture" can effectively fill the talent gap and deliver high-quality composite talents for enterprises.

1.3 Social demand for "artificial intelligence + landscape architecture" informatization talents

Informatization talent is an important force for information construction in the era of big data. In order to promote the process of informatization construction in landscape architecture in the era of artificial intelligence, the social market has put forward new requirements on the knowledge structure of talents, and needs composite talents with "professional + general + intelligent" knowledge[6], to extract the valuable information from the massive data and provide information support for the industry development. Therefore, in the era of big data, the cultivation and introduction of "artificial intelligence + landscape architecture" high-level informatization talent team is predictable for the development of the industry.

1.4 Demand for "artificial intelligence + landscape architecture" researchers in research institutes

In recent years, the development of AI research talents in China has been characterized by rapid growth in quantity, gradual improvement in quality, emergence of cross-border talents, and enhancement of innovation ability and international influence, but there is still a certain gap compared with developed countries such as the U.S. and the U.K., especially the lack of cutting-edge basic research talents[7]. In 2020, Element AI released the *Global AI Talent Mobility Report*. The data show that there is a huge difference between China's talent in the field of AI research and the global reserve of research-oriented talent[8]. In order to achieve a breakthrough, research institutes require that research talents, in addition to high-quality professional skills reserves, need continuous learning and self-renewal capabilities, to reserve excellent "artificial intelligence + landscape architecture" research talent team for the development of China's intelligent era before it is possible to lead the forefront of technology.

2 Exploring the current situation of landscape architecture graduate training under the background of "artificial intelligence + X"

2.1 Lack of clarity on training objectives

The current training objectives of landscape architecture majors are still focused on traditional fields, such as plant research, landscape design, planning and so on. However, with the rapid development of artificial intelligence technology, the market demand for landscape architecture professionals has changed, requiring graduate students to have knowledge and skills related to artificial intelligence. Therefore, it is necessary to adjust the training objectives to fit the market development needs.

2.2 Unreasonable curriculum

The curriculum content setting of a specialty should reflect the current status of education and industry needs in the field. Through the graduate admissions information network, the official website of institutions of higher learning and other information query, it is found that the professional learning of the original landscape architecture graduate course is mostly basic, with insufficient professional depth and interdisciplinary innovation. The knowledge teaching system is difficult to meet the requirements of cross-disciplinary and inter-professional cultivation, as well as the future development needs of the industry, and is impossible to effectively support the achievement of the objectives of graduate personnel training in the context of artificial intelligence.

2.3 Incomplete faculty

At present, most colleges and universities adopt the "1 + 2" segmented training mode for three-year postgraduate students, i.e., the graduate school conducts unified basic teaching training for students in the first year, and their respective tutors are responsible for the last two years. However, at this stage, the faculty of landscape architecture still focuses on traditional fields, whereas there are very few teachers with artificial intelligence and other related backgrounds, and they lack experience in cross-disciplinary graduate training. Moreover, under the single tutor system of graduate training system, the tutor's guidance energy, academic level and knowledge reserve are important factors affecting the quality of graduate training, which will lead to the quality of graduate training being affected. Therefore, it is necessary to strengthen the construction of the faculty, introduce teachers with relevant backgrounds, and encourage teachers to carry out interdisciplinary cooperation and exchange, so as to improve the comprehensive quality of the faculty.

2.4 Lack of quality education and teaching resources

In the postgraduate stage, the source of students in institutions is affected by multiple factors such as the type of the first academic institution and the type of specialized disciplines, which are differentiated. Moreover, as the scale of graduate student enrollment continues to expand, some universities and laboratories are experiencing tensions in teaching resources such as hardware facilities and experimental equipment, which leads to limited experimental conditions for graduate students and affects the quality and level of their academic achievements.

2.5 Lack of practical skills development

Practice teaching is an important link in the training of graduate students in landscape architecture and an important way for students to master relevant skills. However, many postgraduates spend their time on theoretical study and literature research, pay insufficient attention to the practical ability, and neglect the cultivation of practical ability, which leads to the disconnection between theory and practice, and the lack of problem-solving ability and experience in the face of practical problems. Meanwhile, in the postgraduate training programs of some colleges and research institutes, the setting of practical teaching is imperfect, and the teaching strength of practice is relatively weak.

3 Exploration of graduate student cultivation mode of landscape architecture under the background of "artificial intelligence + X"

Based on the above exploration of the cultivation needs of graduate students in landscape architecture under the background of "artificial intelligence + X" and the analysis of the existing problems, the following general framework of the graduate training program and cultivation mode has been made, as shown in Fig.1.

3.1 Positioning of academic personnel training objectives

Landscape architecture is a highly cross-cutting and comprehensive discipline. Therefore, it is important to clarify the positioning and characteristics of the specialty, emphasize its professional advantages in ecological protection, landscape design, spatial planning, etc., and build a cultivation mode with the core of cutting-edge scientific research and innovation ability. At the same time, with the support of artificial intelligence technology, we can further strengthen the scientific and technological content of landscape architecture, innovation ability, new directions and new fields of research for future development, and build a new model of collaborative innovation + artificial intelligence + landscape architecture professional

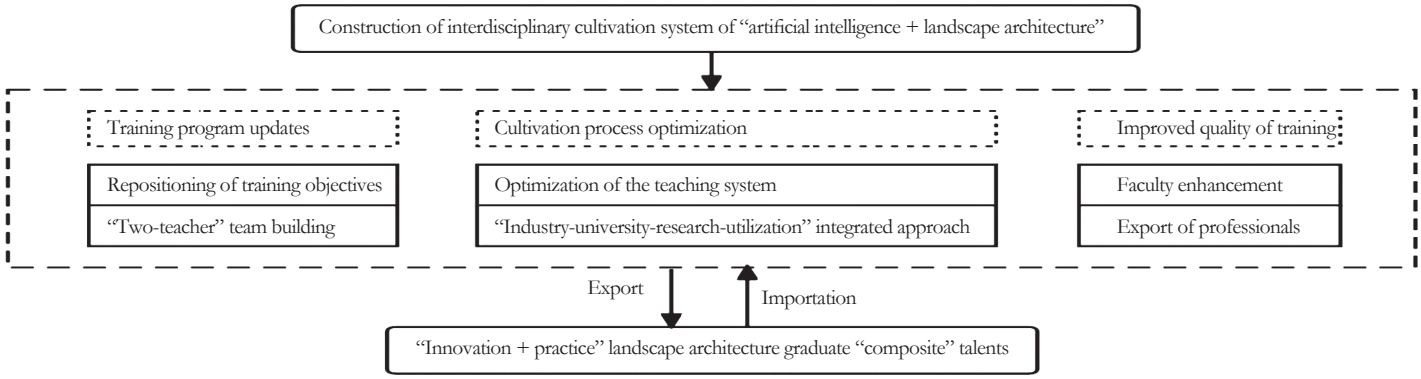

Fig.1 General framework of the training model

characteristics of the "trinity" of scientific research and innovative personnel training. This model is not cured and rigid. Under the premise of creating high-quality training objectives, we can provide personalized training programs according to students' interests and strengths, encourage students to independently choose their own research directions and courses, and stimulate the enthusiasm and creativity of learning.

3.2 Optimization of the teaching system

In order to meet the demand for talents in the context of "artificial intelligence + X", the curriculum system of landscape architecture majors needs to be reformed. In addition to optimizing the traditional course structure, it is necessary to strengthen the popularization of cutting-edge knowledge of professional disciplines, actively explore the combination of landscape architecture and artificial intelligence technology, and offer relevant courses to guide students to master the application of artificial intelligence technology in the field of landscape architecture. For example, artificial intelligence technology is used for landscape evaluation, spatial planning, ecological design, plant identification, data analysis and so on. In addition, it is necessary to focus on cultivating students' innovative thinking and interdisciplinary cooperation ability. It is possible to cooperate with other subject areas, jointly offer relevant courses and subject research, and encourage students to participate in interdisciplinary academic exchanges to broaden their academic horizons and career development paths. Finally, a perfect evaluation system can be established, including students' practical ability, innovation ability and comprehensive quality, and the assessment of the quality and practical application value of academic achievements should be strengthened.

3.3 "Two-teacher" mentor team building

Supervisor is the first person responsible for the training of postgraduates, and postgraduate faculty is an important guarantee for postgraduate education, teaching and research and practice activities[9]. In addition to improving the comprehensive quality and teaching level of the original faculty, enterprise experts can be invited as part-time tutors through university-enterprise cooperation to form a "dual-teacher" tutor team with university teachers and jointly develop training programs. Enterprise experts can provide actual projects and practical experience to better meet students' learning needs, help students master skills in practice and enhance employment competitiveness. Under this condition, it promotes the communication between university teachers and enterprise experts, shares the latest industry news and development trend, and jointly promotes the development of the field of "artificial intelligence + landscape architecture".

3.4 Sound "industry-university-research-utilization" integrated cultivation

Nowadays, the landscape architecture industry has a great demand for talents and high requirements, and the "industry-university-research-utilization" integrated cultivation can meet the demand for professionals in the expanding landscape architecture industry market, and the requirements of interdisciplinary professional integration in the context of artificial intelligence. However, the realization of this model requires the government, universities and enterprises to jointly build a comprehensive and shared learning and exchange platform[10]. In the original training mode, the link of "production and utilization" is weak compared with "learning and research", and the accumulation of theoretical foundation can not be verified by practice. It has an important impact on cultivating graduate students with outstanding professional characteristics by strengthening the practice link, providing more practice opportunities and platforms, and cultivating practical operation ability and problem solving ability. At the same time, it is necessary to strengthen the combination with artificial intelligence technology, including intelligent design, intelligent construction, intelligent management and other aspects. In addition, in the cultivation stage of "production and use", there is no excessive requirement for the cultivation unit, and students can independently choose the development direction, including artificial intelligence and other fields, which can effectively fill the lack of cultivation of practical ability, improve the comprehensive quality, scientific research and innovation, and practical ability, and cultivate high-quality compound talents with both theoretical and practical ability of specialty characteristics from multiple perspectives.

4 Conclusions

Under the background of "artificial intelligence + X", the cultivation of postgraduate talents in landscape architecture has ushered in new opportunities and challenges. In order to maintain the competitive advantage in the cultivation of postgraduate talents, major universities must conform to the development of the times, deepen the cross-fertilization of artificial intelligence and relevant disciplines of landscape architecture according to the demand of the social market, and cultivate high-level, high quality, complex and innovative talents with the characteristics of disciplinary advantages for China. The preliminary exploration of this cultivation mode plays a certain role in promoting the updating of the talent cultivation mode of landscape architecture graduate

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body, share the connotation of Haisi culture, build cultural confidence, and condense cultural identity.

4 Conclusions

From the perspective of world cultural heritage, the protection of cultural routes is a systematic and complex process, and its protection work and planning forms need in-depth exploration and dynamic research. In this study, based on the excavation of the heritage value of cultural routes, the value of sites of Maritime Silk Road in Haikou was comprehensively assessed from the perspective of world cultural heritage, and some suggestions for the protection and exploration of heritage protection were put forward according to the current relevant planning and research work. The protection of historical and cultural heritage is a dynamic exploration process, and it is needed to study and analyze heritage typology based on typology from the dynamic dimension of time, which is also the focus and difficulty of the next stage of research.

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students, and has certain theoretical significance, but it is not perfect, and requires the joint efforts of the government, schools, enterprises and other parties to build and implement.

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