

A Study of Digital Architecture Talent Development Based on the Workcamp Model

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Abstract. Digital architecture is a trend that can not be ignored in today's construction industry, and the development of digital technology has had a far-reaching impact on the traditional construction industry. The cultivation of digital architecture talents has become an important issue in the field of architecture education. In this paper, we take the demand for talent in the construction industry and the development trend of digital architecture as the background, explore the teaching mode and characteristics of the work camp, and put forward a set of digital architecture talent cultivation strategies based on the work camp mode. Through the combination of theoretical analysis and practical operation, it provides certain reference significance for the cultivation of digital architecture talents.

1. Introduction

Innovation education is the eternal driving force of social development and the core of high-level talent training. Innovative education is based on the idealized need to meet the social demand, the transformation, and upgrading of the innovative personnel training system and mode, the progress and development of society, prompting continuous changes in the innovative personnel training system and mode of colleges and universities (Brown T, Wyatt J.2010)^[1], the reorganization of professional courses in the construction of academic disciplines, the incorporation of modern information technology to promote the upgrading of academic disciplines through the main ways of cross-fertilization, collaborative innovation, and sharing of resources. Today, the development of new liberal arts and new engineering has become a new hot spot and a new direction of university education, which will steadily and continuously provide students with comprehensive and interdisciplinary learning opportunities and expand the theoretical system and mode of training innovative talents.

Work camp mode is a teaching mode based on practice, which closely integrates schools and enterprises, and allows students to learn and grow in a simulated real work environment through the practical operation of actual projects (Wei ZL.2021)^[2]. In this paper, we will discuss the digital architecture talent training mode based on the work camp mode, and put forward a scientific and effective digital architecture talent training strategy through case analysis and field research, to provide new ideas and methods for digital architecture talent training.

2. Digital architecture and talent development

Digital architecture refers to the use of advanced digital technology for building design, construction, management, and other aspects of comprehensive digital processing, to improve efficiency, reduce costs, and improve quality. The rise of digital architecture has had a far-reaching impact on the construction industry, and the traditional architectural education system needs to be re-conceptualized and adjusted to digital technology to cultivate professionals who can adapt to the development of digital architecture.

2.1. Trends in Digital Architecture

With the continuous development of information technology and digital technology, digital architecture has become a new trend in the construction industry. Digital architecture can improve the accuracy and efficiency of architectural design and realize the intelligent management of building construction and operation. The change of digital architecture to the construction industry will be all-round, and future construction talents need to have certain digital skills and knowledge reserves.

2.2 The need for digital architectural talent

The rise of digital architecture has posed new challenges to the demand for talent in the construction industry, and the current stage of higher education personnel training is unable to meet the emerging needs of the construction industry. After graduation, students are often faced with

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the gap between digital technology and actual work demands. The demand of construction enterprises for digital construction talents is becoming more and more urgent, and they need to have the comprehensive ability of digital modeling, data analysis, intelligent management, etc. Therefore, the demand for digital construction talents has become more and more urgent. Therefore, the cultivation of digital construction talents has become an important issue in the field of construction education.

2.3 Deficiencies in Traditional Architectural Education

In the traditional architectural education system, the teaching and training of digital technology is not sufficient. There is a certain disconnect between school education and actual work, and students often lack practical experience and practical ability after graduation. The demand for practical operation and practical experience in the field of digital architecture is more prominent, and the architectural education system needs to be adjusted and optimized to adapt to the development of digital architecture.

3. The workcamp model and the development of digital architectural talent

3.1. The concept of the workcamp model

The work camp model is a diversified practical teaching program proposed in response to the limitations of the traditional classroom teaching model. The teaching program is centered on a specific theme, and through the ways of "bringing in" and "going out", it jointly carries out subject teaching, local practice, and thematic practice innovation with other universities or enterprises. The duration of the camp is relatively short, usually one week, but it is relevant, efficient, and highly cross-diversified. Students seek to innovate academically by engaging in hands-on instruction, learning from experience, and actively exploring solutions to problems. This interactive, practice-oriented approach has a significant impact on students' ability to practice, think creatively, and work in teams. Through this teaching method, students can combine theoretical knowledge with practical application and lay a solid foundation for their future careers.

3.2. The concept of digital building talent

Digital architecture is a new type of architectural technology that combines modern computer technology with traditional architectural technology. From the perspective of architecture, digital architecture is a new model based on computer science and the application of information technology and network technology to realize building functions. From the point of view of building technology, digital architecture reflects the

important role of modern computer technology in building design, building construction, building management, and building services. It is a new model for the realization of building functions by applying information technology and network technology

Digital architecture is an emerging field of expertise that requires a wide range of skills including architectural design, digital modeling, building information modeling practices, intelligent systems design, and other types of skills such as project management, project coordination, and teamwork. In the field of digital architecture, the importance of human resources cannot be underestimated, as they play a crucial role in realizing the innovation and efficiency of the construction industry through the mastery and application of technology. Digital architecture talents need to truly enhance the relationship between architecture and nature, architecture and people from the essence through the in-depth application of digital technology means, to ecology, and aesthetics as the goal-oriented comprehensive upgrading of architectural design, the use of complexity thinking to establish the bottom-up integrated relationship between architectural form, environmental performance, full life cycle benefits, through digital design and construction technology, intelligent technology, to realize the architectural design, Through digital design and construction technology and intelligent technology, it realizes the seamless connection between architecture, processing and construction. It realizes the high efficiency, high performance, and high degree of completion of architectural design.

For the talent cultivation mode of digital architecture in colleges and universities, we can open a theoretical course on digital architectural design and construction for undergraduate students in lower grades, so that students can fully understand the current development of digital architectural technology, learn the ideas and methods of digital architectural design and initially understand the process of digital architectural design and construction through the setting and completion of course assignments (from geometric forms to 3D printing) and establish intelligent, rational and innovative architectural thinking; for senior students to carry out the "Digital Construction Festival" activities to stimulate the design inspiration of teachers and student teams using theme innovation and work display, and promote the design inspiration of teachers and student teams (Fabris M F L, Granello G.2019)^[3]. Rational and innovative architectural design thinking; for senior students to carry out the "digital construction festival" activities, thematic innovation and works display, etc., to stimulate the design inspiration of teachers and student teams, to promote the development of digital building technology in teaching and practice, to trigger the attention of the community to the application of digital building technology, to guide the practice of the new paradigm of digital building design and the understanding of the practice units. It will also arouse the attention of society to the application of digital architectural technology and guide the practice units to

recognize and apply the new digital architectural design paradigm.

3.3. The application of the workcamp model in the training of digital architecture talents

The demand for practical operation and practical experience in the field of digital architecture is more prominent, and the work camp is based on the characteristics of practical teaching, which can provide a more effective teaching mode for the cultivation of digital architecture talents. In the work camp mode, students can carry out the design, construction, and management of digital architecture projects in a simulated real work environment, and develop students' digital skills and practical experience through the practical operation of real projects.

The Digital Architecture Workshop seeks new directions in digital development through the integration of digital theory, software teaching, and workshops. Its pedagogical inclusiveness stems from its internal diversity, focusing not only on the architecture itself but also increasingly on the close connection with social issues. The goal of the design is not only to create a sheltered space from the elements but more importantly to contribute to the development of a quality social life. Multiple teachers, multiple backgrounds, and an interdisciplinary approach to teaching and learning are the distinguishing features of the Digital Workshop. In teaching, we emphasize interdisciplinary intersections, with all courses centered on design studios, small class sizes, and close collaboration between different course instructors. The camp is a kind of interactive teaching integration, making architecture education become non-linear, broader thinking, and more diversified training methods, which is expected to enhance the student's ability to think and innovate and cultivate professionals with high comprehensive quality.

3.4. The operation mode and characteristics of the workcamp

Work camp mode is characterized by the organic combination of practical teaching and theoretical teaching, establishing a close cooperative relationship between schools and enterprises, and allowing students to learn and grow in real projects. The work camp mode emphasizes students' practical ability and teamwork spirit and cultivates students' comprehensive ability and innovative consciousness through practical operation.

1) individual development while working in teams

The work camp groups are staffed with students of different ages and professional backgrounds to create a more inclusive team, taking into account their complementary abilities and professional skills (Yakman G. 2016)^[4]. Each team has a leader responsible for controlling the overall work progress and planning the assignment of tasks. Each member of the team is responsible for a significant portion of the work, and each team member provides a diversity of ideas and suggestions based on his or her abilities, as well as

mutual trust and support. While emphasizing the importance of collective wisdom and teamwork, the program also takes into account the cultivation of individual abilities, shaping students into well-rounded individuals with excellent personal qualities as well as the ability to work together as a team.

2) active learning instead of passive acceptance

The teaching activities of the Practical Workshop are centered on solving practical problems and focus on localized teaching activities. By solving typical and common problems in architectural design, the program aims to train students to construct problem-solving logic. In the work camps, this logic-oriented approach provides students with more independent learning options and more challenging problems. These problems require active thinking and exploration, and students need to find solutions from the relationships between the problems and choose the most effective solution strategies to present. Compared with passive acceptance, active learning emphasizes not only the answer to the problem but also the process of solving the problem and logical thinking activities. Therefore, the advantages of active learning in talent cultivation are more significant.

3) Communication and sharing for the enhancement of the overall quality

Communication and sharing is a fundamental characteristic that connects all walks of life. In the work camp, students can learn about the uniqueness of various professions and experience the charm of various disciplines. In addition, it provides a platform for self-exposure, where students can fully express themselves through communication and sharing. In the design practice, teachers and students have a clear division of labor and close cooperation, sharing insights and opinions, but also in the learning and acceptance of others' criticism and advice to improve their design, not only helps to improve the students' professionalism but also broaden their future horizons in life (Tang L, Lin P. 2020)^[5].

4. Strategies for cultivating digital architecture talents based on the Workcamp model

4.1. Establish a digital architecture practice base

To create a real working environment, schools can cooperate with architectural enterprises to establish digital architecture practice bases. In the practice base, students can participate in real digital building projects, design, construction, and management of digital buildings, and cultivate students practical operation ability and comprehensive ability.

4.2. Design digital architecture practice course

To improve the teaching effect, the school can design a practical course on digital architecture, combining digital technology with practical operation. The practical

courses can cover digital modeling, data analysis, intelligent management, and other aspects of the content so that students learn and grow in the actual project.

4.3. Cultivate a digital architecture practice team

To improve the teamwork spirit, schools can set up digital architecture practice teams, so that students can learn and grow in teamwork. The practice team can be composed of students, teachers, and enterprise experts, and jointly participate in the design, construction, and management of digital architecture projects, to cultivate students' teamwork spirit and innovation consciousness.

5. Case studies

Take Beijing City University as an example, the school and the Beijing Municipal Institute of Architectural Design established a strategic partnership, the establishment of a digital architecture practice platform, in 2020, cooperation held the first Beijing mechanical arm digital creation of the international work camp to online and offline way to carry out, the first online for the digital program design stage, personalized teaching in small groups, digital model design, invited the China Academy of Architectural Design, We invited many experts and designers from China Academy of Architectural Design, Beijing Municipal Institute of Architectural Design and teachers from many universities at home and abroad to form a teaching practice team. In the physical construction part of the camp, students worked in small groups and completed three physical construction results by using robotic arms, 3D printing, and other intelligent construction means (Fig. 1). In the work camp, students participated in the whole process of parametric design and construction experience, so that students experienced the charm of digital construction, and played a positive role in promoting the cultivation of digital talents, this practical activity is a positive and effective exploration of the cultivation of digital architectural talents under the mode of the work camp (Fig. 2).

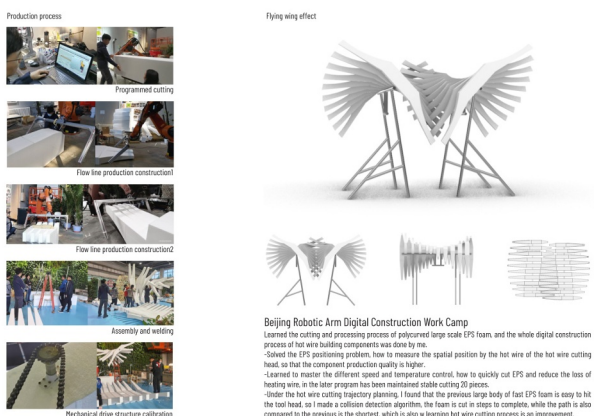


Fig. 1. 2020 Beijing Robot Arm Digital Creation International Work Camp - Deliberation of Robot Arm Hotline Cutting Digital Design Scheme



Fig. 2. 2020 Beijing Robot Arm Digital Construction International Work Camp - Robot Arm Work Camp Wooden Structure Construction Process

6. The Enlightenment of Work Camp Teaching on Talent Training Models in Universities

With the proposal of the new concept of talent cultivation in engineering, the training mode and system of architectural design professionals in China are also facing a period of transformation and development. Inevitably, the traditional single professional background, relatively closed curriculum teaching mode, and fixed classroom training system will develop towards an open new engineering training mode. Therefore, the undergraduate applied innovative talent training model under the new engineering training model will be a combination of basic theory and social practice.

Joint work camps are practical activities that emphasize design logic and cultural innovation and are explorations of innovative talent cultivation models that are cross-domain, diverse, flexible, and practical. The teachers and students of the joint practical work camp come from different countries, universities, and enterprises. The activities have increased the connection and integration between schools and enterprises, school locations, and schools, which is of great help to broaden students' international perspectives and broaden their design thinking. Activities not only enhance students' professional abilities but also greatly enhance their comprehensive ability cultivation. Therefore, using practical teaching activities in work camps to stimulate innovation in the mechanism and organization of talent cultivation in universities, promoting the construction and improvement of the new engineering talent cultivation system, is undoubtedly one of the effective methods.

7. Conclusions and outlook

Digital architecture is a trend that cannot be ignored in today's construction industry, and the cultivation of digital architecture talents has become an important issue in the field of construction education. The work camp mode provides a scientific and effective teaching mode for the cultivation of digital architecture talents, which

cultivates students' digital skills and practical experience through practical operation and teamwork. Through case study and research, this paper proposes a set of digital architecture talent cultivation strategies based on the work camp model, which provides new ideas and methods for digital architecture talent cultivation. In the future, the field of architectural education can further deepen the work camp mode and explore more digital architecture talent cultivation modes to adapt to the development of digital architecture.

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