Exploration and Practice of Talent Cultivation in Applied Undergraduate Universities under the Background of Digitization

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Abstract: In response to the changes in talent demands and educational methods spurred by industrial digitization, universities need to adjust their strategies, drive teaching reform with digital technology, and cultivate talents that meet the development needs of the digital economy. Based on the cultivation of digital applied talents, Chengdu Neusoft University has adjusted and optimized its major structure, improved the cultivation content of majors related to the digital industry, and created intelligent and ecological learning scenarios based on digital technology through four transformations, aiming to cultivate applied talents that meet the development of the regional digital economy.

1. Introduction

The report of the 20th National Congress of the Communist Party of China puts forward the important task of building a modern industrial system, emphasizing the need to "accelerate the development of the digital economy, promote the deep integration of the digital economy and the real economy, and create a digital industrial cluster with international competitiveness." The integrated development of industrial digitization requires a large number of industrial talents with good digital literacy as support. As the main body of advanced talent cultivation and an important support for scientific research, economic construction, and social development, higher education is also actively undergoing changes to embrace the significant challenges and opportunities of digital transformation and digital industry talent cultivation.

2. The Practical Foundation for Cultivating Talents in Digital Industries

2.1 Industrial digitization drives changes in talent demand

With the rapid development of digital technology, it has not only spawned emerging professions in digital industries such as data processing engineers and meta-universe digital entity manufacturing engineers, but also prompted the industrial transformation and upgrading of traditional industries, leading to digital transformation actions in various fields such as digital + industry, digital + healthcare, digital + arts, and digital + services. According to the "Report on the Development of China's Digital Economy Industry (2023)" released by the China Academy of Information and Communications Technology, the scale of China's digital economy exceeded 50 trillion yuan in 2022, accounting for 41.5% of the total GDP, ranking second in the world after the United States[1]. While China's digital economy is developing rapidly, the number and scale of talents cultivated by the higher education system cannot effectively support the employment needs of digital economy development. As of 2022, the number of talents employed in China's digital economy industry was approximately 36 million, with a shortage of more than 11 million digital talents[2]. The lack of compound digital talents who possess professional knowledge and basic digital information capabilities, data collection and analysis capabilities, cross-border integration capabilities, has become an important shortcoming restricting the development of the digital economy.

2.2 Digital technology innovation promotes the reform of education methods

Digital technology has a significant impact on education in various aspects, including knowledge acquisition, learning methods, learning organization, and learning experience. For knowledge acquisition, search engines can support students to obtain a large amount of resources and information easily, enabling them to be liberated from simple cognitive activities such as memory and engage in higher-level cognitive activities such as innovation and creation. What's more, the internet has broadened and broken the limitations of educational practice and space, enabling teachers and learners in different time and space to interact synchronously and asynchronously. As for learning organization, the development of artificial intelligence technology has changed the relationship between educational subjects. Artificial intelligence replaces some of the teachers' functions in knowledge transmission, allowing teachers to focus on guiding learning from complicated teaching tasks. In terms of learning experience, the combination of virtual reality technologies such as XR and education creates a highly immersive learning environment, making learning content more realistic. In general, the innovative development of digital technology will not only affect human cognitive methods but also lead to systematic reforms in teaching and learning methods in higher education.

2.3 Social and cultural changes accelerate higher education reform

In 2001, the educational game expert Marc Prensky first proposed the concept of "digital natives", referring to those who grew up in the digital era as "digital natives". The "2020 National Report on the Internet Usage of Minors" pointed out that there are 183 million minor internet users in China, with an internet penetration rate of 94.9%, and most minors have their own internet devices and new intelligent terminals[3]. The digital native generation has grown up with digital technology, and their cognitive and learning methods have been deeply influenced by digital technology and digital platforms. Currently, the digital native generation is gradually becoming the main target of higher education services. To cultivate the digital native generation, higher education needs digital transformation urgently, paying attention to changes in learners' knowledge levels, cognitive methods, digital reforms in teaching and learning, and the evolution of talent abilities in the digital era.

3. Higher Education Model for Talent Cultivation in the Digital Industry

The report of the 20th National Congress of the Communist Party of China proposed: "Promote the digitization of education and build a learning society and a learning country. In 2012, the Ministry of Education issued the "Ten-Year Development Plan for Education Informatization (2011-2020)", pointing out that it is necessary to actively explore the comprehensive and deep integration of modern information technology and education, and fully leverage the supporting and leading role of education informatization in education reform and development. In 2019, the CPC Central Committee and the State Council issued the "China Education Modernization 2035," which clearly proposed accelerating the transformation of education in the information age and achieving an organic combination of modularized education and personalized education. In 2022, the State Council emphasized in the "14th Five-Year Plan for Digital Economy Development" to deeply promote smart education, promote new infrastructure for education, and build a high-quality education support system. [4]

Currently, various application-oriented undergraduate universities actively respond to the national call, promote the integration of digital technology into education and teaching vigorously, and especially after online teaching during the three-year pandemic, application-oriented undergraduate universities have basically achieved the expansion of online teaching spaces. However, with the continuous development of digital technology, the way to expand teaching spaces can no longer support the development needs of the digital economy. The digital economy requires application-oriented undergraduate universities to adjust their strategies, utilize digital technology to promote reforms in professional construction, curriculum teaching, student learning, teacher development, and cultivate high-quality application-oriented talents suitable for the development needs of the digital economy.

3.1 In terms of curriculum teaching

It is required to make full use of technologies such as big data and AI teaching assistants under the traditional class format and curriculum system to achieve precise analysis and regulation of students' learning processes and precise prediction of learning outcomes. It is necessary to provide students with personalized learning plans and carry out differentiated teaching.

3.2 In terms of student learning

It is required to construct an autonomous learning environment through digital technology, enabling learners to access learning resources anytime and anywhere without being restricted by time and space. Students should be cultivated to have the basic abilities required in the digital era and effectively acquire new skills, new attitudes, and new thinking with the help of digital tools.

3.3 In terms of teacher development

It is required to change the role positioning from traditional knowledge transmitters to student learning mentors and development consultants. At the same time, teachers are required to actively face the impact of digital technology, leverage digital technology to innovate teaching concepts and teaching abilities, enhance their practical ability in digital innovative teaching, and adapt to the opportunities and challenges brought by digitization. [5]

4. Exploration and Practice of Talent Cultivation in Digital Industry

Chengdu Neusoft University is a university that focuses on training talent for practical applications, which is located in one of the cores of the Chengdu-Chongqing Economic Circle, Facing the development opportunities of digital transformation, the university has made arrangements for digital talent cultivation early. It connects with the "5+1" modern industrial system in Sichuan Province, and relies on the digital industry background of Neusoft Group to form a digital industry education direction focusing on "health + IT". Based on the optimization of the major structure related to digital industry, the university optimizes the talent cultivation objectives from three dimensions: mastery of digital skills and knowledge, construction of digital cultural atmosphere, and creation of digital teaching environment. Through digital skills + professional skills, it promotes four transformations: through digital technology + education and teaching. With digital technology + teaching resources, it builds three supporting platforms to optimize the existing talent cultivation system and achieve the cultivation of digital talents（Fig 1）.
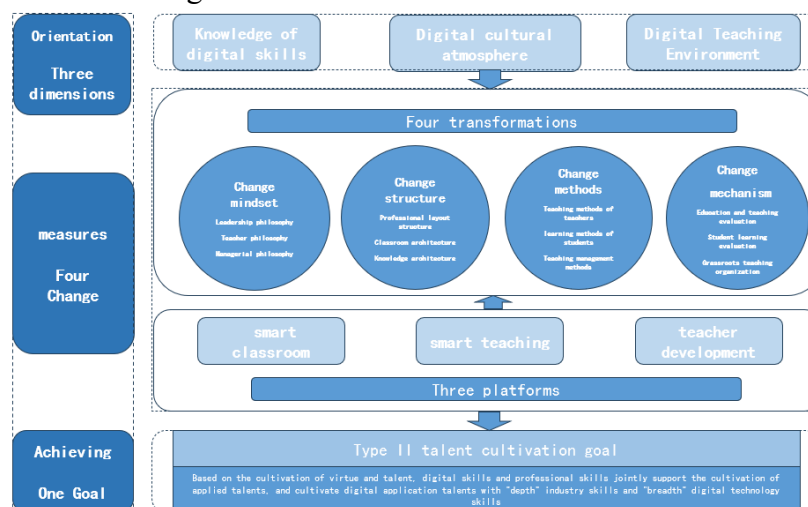

Fig 1. Training path for digital application talents

4.1 One Goal: Integrating Digital Skills into Professional Training and Setting a Goal for Digital Talent Cultivation

Through investigating the digital talent needs of relevant enterprises and industries, Chengdu

Neusoft University proposes the goal of cultivating Type II applied digital industry talents. The cultivation of Type II talents is based on moral education and character building, supported by digital skills and professional skills, which together constitute the ability structure of applied digital talents (Fig 2). This aims to cultivate digital applied talents with "in-depth" industry skills and "extensive" digital technology skills.
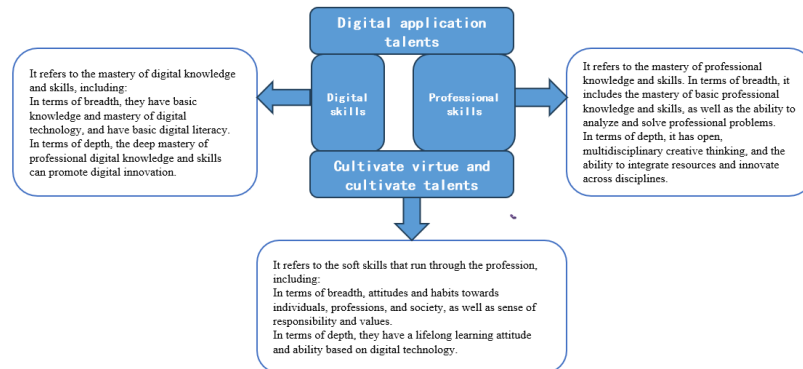

Fig 2. The ability structure of Type II talents

4.2 Four Transformations: Leveraging Digital Technology in Education and Teaching to Foster a Digital Cultural Atmosphere

4.2.1 Transformation of concepts

The leadership needs to transform its concepts. University leaders fully recognize the opportunities and challenges brought by the digital economy to universities, transform their concepts to become leaders and decision-makers in transformational development, and promote the integration of digital talent cultivation into the top-level design of the university. This includes fostering students' mastery of digital professional knowledge and skills, enhancing their innovation, integration, and transformation-driving abilities, and cultivating cross-boundary and integrated applied talents. Teachers also need to transform their concepts. As the direct implementers and executors of digital teaching, the university conducts extensive discussions on undergraduate education and teaching ideas, focusing on the impact and countermeasures of information technology on higher education. Through seminars, thematic activities, lectures, and other forms, it aims to liberate minds, engage in discussions, create a digital innovation atmosphere in the university, and enhance teachers' digital awareness, abilities, and attitudes. Management personnel must also transform their concepts. They are responsible for supporting and promoting digital transformation, playing a connecting role in the transformation. The university actively promotes a digital upgrading plan for management personnel, enhancing their awareness and ability in digital management through various platforms, data analysis tool training, learning manuals, digital skill learning certificates, and inclusion in performance evaluations.

4.2.2 Transformation of structures

The university transforms its professional layout structure, shifting from focusing on IT majors to a broader IT + healthcare technology-related majors. It prioritizes and features the development of digital arts and healthcare technology as two major training directions, while strengthening supportive disciplines such as computer software, artificial intelligence, and big data. Meanwhile, the university revises the "Discipline and Professional Construction Management Measures" to establish a professional adjustment mechanism and structure that aligns with the digital transformation of industries. The curriculum system structure is also transformed, with the university revising the guiding principles for professional talent cultivation programs, requiring the introduction of digital skill cultivation and highlighting professional applied ability cultivation. The curriculum is "broken down and reorganized" to reconstruct the curriculum system structure. The knowledge system structure is transformed as well. Facing the goal of cultivating digital talents, the university comprehensively reviews the knowledge structure of its existing IT + healthcare technology-related

majors and disciplines, clarifies major and knowledge structure maps, uses digital technology to construct a knowledge map, clarifies the teaching content for digital talent cultivation, and accurately identifies it. The university strengthens mathematics and algorithm teaching, summarizes new concepts such as block-chain, artificial intelligence, and the meta-universe as basic teaching content, and enhances the cultivation of professional foundations in computer science, software, and big data.

4.2.3 Transformation of methods

Teachers transform teaching methods, the university is promoting blended teaching, issuing the "Implementation Opinions on Blended Course Teaching Reform" and the "TOPCARES Model Course Evaluation Scheme (Blended Course)", encouraging teachers to integrate technologies such as big data and AI assistants into courses and teaching processes. This spatially and temporally expands teaching scenarios, employs various teaching methods, and constructs an immersive classroom experience environment, transforming teachers from knowledge transmitters to learning guides. Students' learning methods are also transformed. The university promotes online resource construction, integration of in-class and out-of-class learning, and learning community construction based on projects such as experiments, entrepreneurship, competitions, and practice. This changes students' learning and cognitive styles, shifting them from traditional learning methods in fixed spaces and static resources to ubiquitous learning methods. The university also transforms its teaching management methods, adopting a data-driven approach for management and decision-making. It actively promotes data acquisition, processing, storage, analysis, visualization, and application based on different problem scenarios in teaching management.

4.2.4 Transformation of mechanisms

The university transforms students' learning evaluation mechanisms. It revises institutional documents such as the "Course Assessment Management Measures" and requires teachers to build a multi-dimensional and three-dimensional learning evaluation system using data generated during the course teaching process. This transforms students' learning evaluation from static, terminal evaluations to dynamic, diverse, process-oriented, and feedback-based evaluation mechanisms, enabling precise analysis of learners' entire process, accurate prediction of teaching results, and precise regulation of the teaching process, meeting learners' personalized learning needs. The university also transforms its teaching quality evaluation mechanism, introducing big data technology into teaching quality evaluation, shifting it towards data-driven, large-scale evaluation. It utilizes equipment such as cameras and online teaching platforms to optimize data collection and evaluation analysis, enabling data collection to cover all time periods and spaces, enhancing the authenticity, objectivity, and accuracy of collected data. The university also transforms its grassroots teaching organization mechanisms, introducing digital technology into teaching organizations, promoting the construction of virtual teaching organizations, and establishing more flexible, dynamic, and diverse teaching organizations.

4.3 Three Pillars: Integrating Digital Technology into Teaching Resources to Create a Smart Education Environment

4.3.1 Smart Classroom Platform

The digital transformation requires that physical teaching environments such as classrooms can respond interactively to various teaching activities within the space, realizing the intercommunication of teaching data between physical and digital spaces. Schools complete the digital upgrade of classrooms by adding digital equipment, realizing the "smart" transformation of all classrooms in the school and achieving full Wi-Fi coverage in all buildings. Through the smart blackboard campus equipment operation and maintenance management system and the electric control system, it is possible to manage all smart classrooms in the school in a "one-stop" manner, and achieve real-time collection, collation, analysis, and visual presentation of teaching data.

4.3.2 Smart Teaching Platform

With the continuous updating and iteration of digital technology, universities are required to maintain a "developmental mindset" in the application of new technologies and continuously integrate new technologies into the existing teaching environment. The school actively upgrades the existing platform and introduces new technologies to create a 4S teaching service platform. The 4S platform consists of four major modules: educational computing power (PaaS), process management (SaaS), resource management (CaaS), and data analysis (DaaS), including 16 subsystems such as talent cultivation programs, curriculum resources, smart teaching, cloud practice management, and quality evaluation. It provides service support and data support for the entire teaching process, building a technological environment for teaching reform.

4.3.3 Teacher Development Platform

Teachers are the leaders of digital teaching and the key to digital transformation. To establish teachers' digital teaching awareness and enhance their digital teaching abilities, the school has jointly built a cross-regional and cross-school teacher exchange and development platform with Dalian Neusoft University and Guangdong Neusoft University. The school has been continuously paying attention to improving teachers' digital teaching abilities. Since the establishment of the platform, more than 30 digital teaching ability training sessions have been conducted in the past two years, covering the school's leadership, management and research personnel, as well as course teachers. The Teacher Development Center of the school promotes a plan to enhance teachers' digital abilities, starting from several dimensions such as awareness, literacy, ability, and research in integrating digital technology into teaching. It effectively supports the improvement of teachers' digital teaching abilities through various forms such as online training, special lectures, workshops, seminars, teaching awards, teaching evaluation, and teaching funding, combining virtual learning with teaching practice.

5. Conclusion

Facing the rapid development of the digital economy and digital technology, the digital transformation of higher education and the cultivation of digital industry talents still face many challenges. Talent cultivation reform that adapts to the digital economy era will be a long-term and systematic project. Based on its own educational positioning and conditions, Chengdu Neusoft University has actively explored the cultivation of digital industry talents, providing experience for the reform of digital industry talent cultivation in applied undergraduate universities. However, there is no unified model for the cultivation of digital industry talents in applied undergraduate universities. Each university should start from target guidance, macro-planning, and systematic design based on its actual conditions such as school scale, positioning, development goals, and talent cultivation characteristics. They should work steadfastly, be innovative, and strive to explore a path suitable for the cultivation of digital industry talents that aligns with regional economic development.

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