

Exploration and Practice of Innovative Application Talent Cultivation Based on the "Five-level Project System"

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Keywords: Project-based teaching system; Cultivation of innovative application talents; Chengdu Neusoft University

Abstract: With the demand of new quality productivity for innovative application talents, project-based teaching as an important teaching method to cultivate students' innovative ability, which has been paid more attention by universities. With the goal of cultivating talents suitable for innovative application, Chengdu Neusoft University carries out project-based teaching research and practice, and explores the construction of project-based teaching system. In order to build a learning environment suitable for project-based teaching, promote the integration of projects into the entire teaching process, and achieve the improvement of students' professional comprehensive literacy, innovation and entrepreneurship, and ability to solve complex engineering problems, and meet the requirements of economic and social development for the training of applied talents, the university has created a "five-level project system" and adopted four measures of "reform-integration-change-construction".

1. Introduction

The report of the 19th National Congress of the Communist Party of China stated that "China's economy has transitioned from a stage of high-speed growth to a stage of high-quality development." In particular, the Central Committee of the Communist Party of China has repeatedly proposed that "the development of new quality productive forces is an inherent requirement and an important focus for promoting high-quality development." This indicates that the domestic economic development has entered a new stage, the economic structure is facing profound adjustment, and the new quality productive forces have become an important part of the economic structure change. The new-quality productive forces is developed with the rapid development of globalization, knowledge economy, network, big data and artificial intelligence. The new quality productive forces is developed with the rapid development of globalization, knowledge economy, network, big data and artificial intelligence. It promotes high-quality economic development through technological innovation and industrial upgrading, thus presenting a new situation of "cross-border, cross-cutting, integration, rapid and changeable". Besides, it also puts forward new requirements for talents. In addition to traditional professional knowledge and skills, innovative application talents with innovative ability, cross-integration ability and independent learning ability are also needed^[1].

As an important force to promote social development, higher education bears the responsibility of serving the economy and providing the talents needed to support the development of productive forces. Although China has successfully established the largest system of higher education in the world, however, due to the economic transformation and the development of information technology, there is a certain disconnect between the supply of higher education talents and the demand of economic development. Moreover, in the face of the rapid development of new quality productive forces, especially the issues of lagging and disconnection in higher education talent training, the key path to achieving high-quality development in China lies in improving the quality of applied talent training and creating a new type of labor force that matches the development of these new quality productive forces. So that, the primary task of higher education personnel training is to train

innovative application talents with innovative ability and high-level ability to solve complex engineering problems.

2. Research status

Project-based teaching is student-centered, and it achieves the mastery of professional knowledge and skills through the completion of teacher-guided projects^[2]. Besides, project-based teaching plays a positive role in improving students' innovation ability, enhancing their learning initiative, and cultivating their ability to mobilize interdisciplinary knowledge to solve complex problems. Therefore, many universities introduce project-based teaching actively. Taking the database of China National Knowledge Network (CNKI) as an example, through the accurate keyword search, it is found that more than 3,400 articles were published under the "project-type" topic from 2013 to 2023. As can be seen from the trend chart of paper publication (see Figure 1), it is pointed out in policy documents such as the Guiding Opinions on Guiding Some local ordinary undergraduate Universities to Transform to Application-Oriented in 2015 and the Implementation Opinions of The General Office of the State Council on Deepening the Reform of Innovation and Entrepreneurship Education in Colleges and Universities in 2016, "Implementing the case teaching and project teaching" is an important measure to deepen talent training and education and teaching reform, and enhance talent innovation ability^[3], and project-related papers have attracted a wave of growth. In 2022, the state proposed to cultivate innovative talents that meet the new quality productive forces requirements^[4]. Thus, the number of project-based papers shown a rapid increase. This, in turn, shows that the role of project-based learning in cultivating innovative talents has been widely recognized by various sectors of society, and project-based teaching is increasingly becoming a research hotspot in talent development.

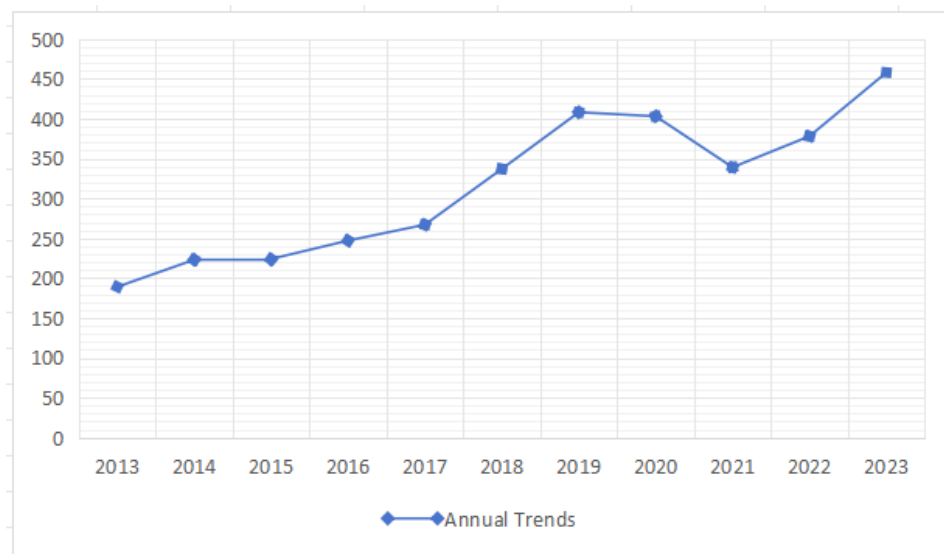


Fig 1. Trend chart of paper publication(sourced from the CKNI database)

By further utilizing the visual analysis function of CNKI database (FIG. 2), during 2013-2023, project-based learning has been widely used in teaching of various disciplines and levels in China, and 27.12% of papers related to the application of project-based learning in higher education have been published in various related researches. This reflects the attention and emphasis of universities to project-based teaching, and also shows the deepening of research on project-based teaching in domestic universities.

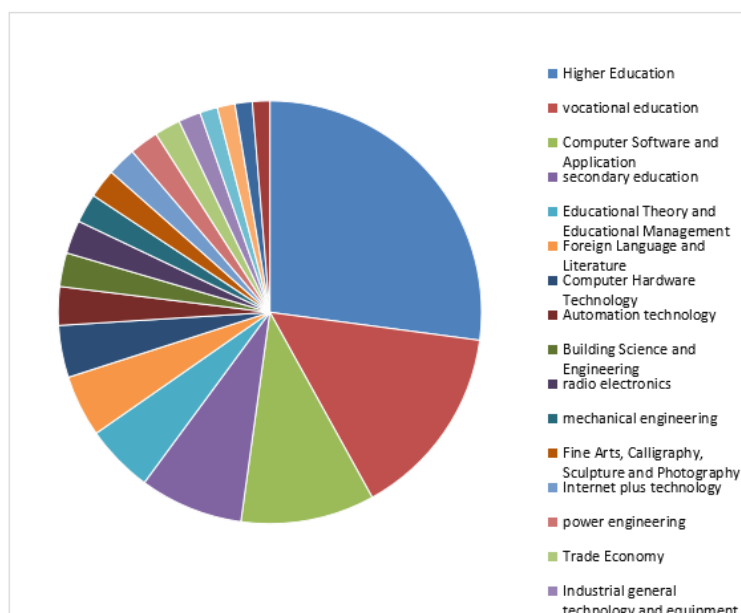


Fig 2. CKNI database - visual analysis results

At present, project-based teaching has been widely used in universities, which have carried out research from the aspects of project learning mode, teaching implementation, teaching design, teaching evaluation, training of double-qualified teachers, construction of school-enterprise cooperation project database and so on, and made great achievements. And with the proposal of new quality productive forces and the rapid development of digital economy, project-based teaching plays an increasingly prominent role in training innovative application talents. However, there are some problems in the current project-based teaching, which cannot support the requirements of new quality productivity on talent training:

(1) Lack of system. At present, the cultivation path of talents in universities is influenced by tradition, which is generally dominated by knowledge logic. Teachers mainly emphasize the integrity and systematicness of disciplines, and pay attention to the imparting of theoretical knowledge. The setting of the curriculum system is also biased towards the major, the total amount is too much and the content is overlapping. The logic between courses is set around subject knowledge, which leads to teachers' separate teaching projects, and each course project is independent, lacking coherence and coordination. It can not effectively promote large-scale comprehensive project teaching, nor can it effectively develop students' ability to solve complex engineering problems.

(2) Lack of accommodation. At present, the training process of professional talents in universities is relatively independent, and there is a lack of effective cross-integration means between majors. Although project-based teaching is used in universities, it is only carried out in majors, and there is a lack of cross-specialty and interdisciplinary project-based teaching platform, which fails to form a joint force among majors. Therefore, it is impossible to effectively cultivate students' cross-disciplinary composite ability and cross-border integration ability of knowledge, and it is even more difficult to cultivate students' innovation and entrepreneurship ability^[5].

(3) Lack of adaptation. As the measures of talent training are generally dominated by schools, there is a lack of endogenous motive mechanism for industry enterprises to participate in college talent training. And because it involves the interests of enterprises themselves, the enthusiasm of industrial enterprises to incorporate real projects into talent training is not high. This leads to the separation of the projects relied on by the project-based teaching in colleges and universities from the real enterprise engineering projects, and the effective integration with industrial technology cannot be realized, and the talents cultivated are also misaligned with the needs of enterprises.

3. Exploration and Practice of Cultivating Innovative Applied Talents

Chengdu Neusoft University is an application-oriented university. In order to adapt to the rapid

development of the digital economy, enhance the ability to serve the development of national and local industries, and cultivate innovative application talents suitable for new quality productive forces, Chengdu Neusoft University takes projects as its starting point, carries out project-based teaching research and practice, and explores the construction of a project-based teaching system.

By connecting knowledge points, single courses, and course groups through projects, the school "creates" and implements a five-level project system of the four years of the university, and constructs a learning environment suitable for project-based teaching through four measures of "change-in-change-build", promotes the integration of projects into the whole teaching process, and enables students to integrate professional knowledge through the practice of projects at different levels. This enhances students' awareness of innovation and their ability to solve complex engineering problems^[6].

3.1 "Create" five-level projects to create a full-process project-based learning experience

Based on the principle of work process and ability advancement, the school has created a five-level project system of "unit project - unit group project - course project - course group project - comprehensive project" characterized by "integration of science and practice and ability advancement" (see Figure 3). The five-level project system covers the whole training process of four years. In the first year, students can improve their cognitive ability and knowledge reasoning ability of their major through practical courses based on project-led courses (first-level projects). In the second and third years, 7-9 core professional courses will be transformed into project courses (i.e., Level 3, Level 4 and Level 5 projects) through the project-based curriculum transformation, and practical courses will be created based on the project curriculum group (i.e., level 2 projects) to form a gradual and advanced professional curriculum system and improve students' application and creativity. Through comprehensive practical courses (first-level projects) in the senior year, students are guided to participate in cross-college and interdisciplinary comprehensive project training, and students' comprehensive practical ability and thinking innovation ability are enhanced by completing real projects or scientific and creative projects from enterprises.

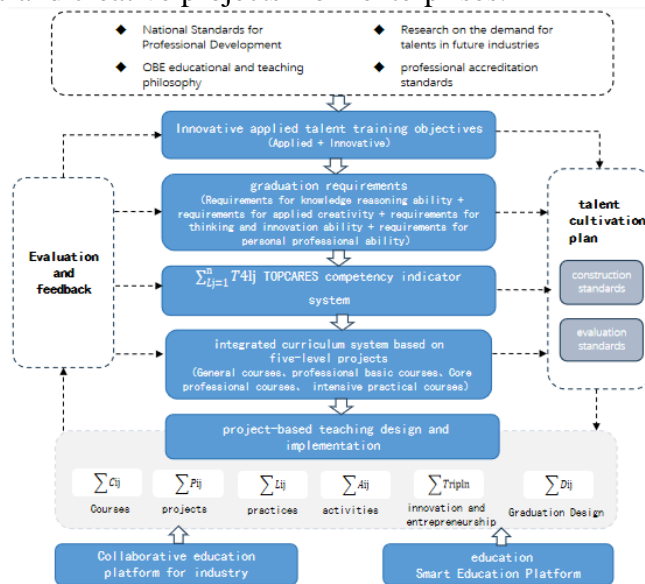


Fig 3. Five-level Project System

3.2 Change the training mode and optimize the implementation path of project-based training

The school breaks down the boundaries between semesters and courses, and integrates and optimizes the training program around the five-level project system.

- The school reconstructs the semester system to realize the integration of subject knowledge and practical teaching. Implementation of the "1321" semester setup (1 academic year is divided into 3 semesters, 2 theoretical semesters based on cases and projects, and 1 practical semester of intensive ability training).
- The school has optimized the professional curriculum and formed a project-oriented professional

curriculum system. Create project courses: add new pilot courses (i.e. professional guidance courses), and incorporate 7-9 professional core courses into the overall design of the five-level project to form a combination of advanced project courses. Strengthen practical courses: set up primary school practice, comprehensive practical training courses, improve the proportion of practical courses.

- The school strengthens the general courses to expand the breadth of students' learning. We will add compulsory general courses on innovation and entrepreneurship, build high-level general elective courses, broaden students' academic horizons, and enhance students' innovative thinking.

3.3 "Entering" teaching management, forming an endogenous mechanism for project-based teaching

From the three dimensions of system construction, standard formulation and document improvement, the school has formulated supporting management systems such as "five-level project system management implementation measures" and "industry-university cooperation management measures", and guided projects into the whole teaching process through the system.

3.4 "Change" teaching methods to improve students' self-motivation for autonomous learning

The school promotes project-based teaching. Teachers transform knowledge form into project tasks, and promote students to realize the development of knowledge reasoning ability and application creation ability in the completion of project tasks; In addition, teachers innovate blended teaching. They transfer the learning process of subject knowledge to the online platform, and the offline teaching focuses on project tasks to realize the expansion of the depth and breadth of learning. And teachers improve the assessment method. They incorporate the comprehensive ability evaluation into the evaluation and form a process evaluation mechanism based on project teaching.

3.5 "Build" a guarantee mechanism to create a platform for deep integration of real projects

The school provides the necessary institutional guarantee. By actively promoting school-enterprise cooperation and optimizing the collaborative education mechanism for deep school-enterprise cooperation, the school effectively advances this cooperation in eight aspects: goals, programs, courses, projects, teaching materials, teaching, practice, and employment. In addition, the school provides platform protection. By building a smart teaching platform in line with project-based teaching and promoting the construction of project teaching resource library, the implementation and testing of OBE achievement can be realized. The school attaches great importance to quality assurance. Based on the concept of OBE, the quality assurance system is optimized, the evaluation of student learning effect is strengthened, and the dual-cycle quality monitoring inside and outside the school is strengthened, and the quality assurance system matching project teaching is finally formed.

4. Conclusion

With the rapid rise of digital economy and the transformation of new quality productivity on talent demand, there is a certain mismatch between talent training and economic and social demand in colleges and universities, which requires universities to adjust and optimize the existing talent training strategy. However, the optimization and adjustment of talent training is a long-term, complex and systematic project, and the situation of talent orientation, training objectives and governance system of each university is also different. Therefore, all the universities should fully combine their own situation and use artificial intelligence, big data and other technical means to form their own needs of talent training optimization strategies. What is more, Chengdu Neusoft University, as an application-oriented undergraduate university with distinctive characteristics in Sichuan Province, is faced with the impact of the digital economy. Therefore, the school needs to build a teaching system around the project and actively introduce new technical means into teaching to improve the effectiveness of talent training, so as to form an innovative talent training system suited to itself and in line with social and economic development. The school hopes that it can be used as a reference for other similar

undergraduate universities.

Acknowledgements

The authors gratefully acknowledge the financial support from 2024 China Private Education Association Research Project: Construction and Practice of the Support System for Teachers' Teaching Innovation in Application-Oriented Universities(Serial Number: MBXH22ZD02) .

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