

# *Analysis on the Training Mode of Civil Engineering Specialty Applied Talents in Applied Local Colleges under the Background of 'New Engineering'—Taking Gannan University of Science and Technology as an Example*

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**Abstract:** The concept of new engineering puts forward new requirements for the training of traditional engineering talents. It is also the guiding ideology of ' student-centered, results-oriented and continuous improvement ' as the talent training system. Under the above background, the training mode of civil engineering talents should adapt to the development of the new era, pay attention to the needs of local industries (enterprises) for talents, and actively carry out their own adjustment and innovation. The application-oriented local undergraduate colleges and universities should take the cultivation of high-quality applied talents needed by industrial transfer and upgrading and social and economic development as the core, promote the integration of industry and education, school-enterprise cooperation as the main way, and serve the local regional economy, local leading industries and emerging industries as the fundamental orientation to cultivate high-quality characteristic applied talents with strong adaptability, strong operation ability and innovative entrepreneurial skills suitable for local regional economic development and industrial chain docking

## **1. Introduction**

In order to adapt to the new round of scientific and technological revolution and industrial change, support a series of national strategies such as service innovation-driven development and ' Made in China 2025 ', the Ministry of Education has held conferences in Shanghai, Tianjin and Beijing since February 2017, and proposed to carry out research and practice of new engineering, which opened up a new path for engineering education reform. New engineering focuses on ' new ', which represents the emerging, new ideas, new majors, new structures, new systems and new talent training models <sup>[1]</sup>.

## 2. Analysis

### 2.1. Analysis on the current situation of training mode of civil engineering talents in application-oriented local universities

By combing and analyzing the relevant research literature and the talent training scheme of civil engineering specialty in colleges and universities, the construction of talent training system is strengthened from the five dimensions of curriculum system construction, teaching system construction, teaching material system construction, teacher system construction and practice system construction. In terms of curriculum system construction, it is proposed to strengthen the teaching of basic theory courses, strengthen the teaching of practical courses, strengthen the construction of teaching software and hardware, and establish a professional engineering technology education and training system with social communication. In the construction of teaching system, it is proposed to reform teaching methods, increase the proportion of practical teaching and heuristic teaching in university teaching, and reduce the proportion of traditional teaching in university teaching methods. In the construction of teaching material system, it is proposed to strengthen the construction of high-quality applied teaching materials and the reform and innovation of the contents in the notes. In terms of the construction of teacher system, it is proposed to build a teacher team with professional engineering literacy and strengthen the construction of 'double teachers and double abilities' teachers. In the construction of practice system, it is proposed to strengthen the construction of application-oriented practice teaching platform and improve the proportion of professional practice courses. Establish a multi-level, comprehensive practical teaching system. Comprehensive analysis shows that the research on its application in docking industrial needs and optimizing professional structure, improving teaching quality monitoring and evaluation system, promoting Internet + civil engineering education, paying attention to students' interest and personalized development is not enough.

### 2.2. Main problems in the training of civil engineering professionals in applied local universities

Compared with traditional engineering, new engineering emphasizes the practicality, interdisciplinary and comprehensive of disciplines, especially the close integration with Internet +. However, due to some objective and subjective reasons, there are mainly the following problems in the training process of traditional civil engineering professionals:

#### *(1) Inaccurate positioning of talent training mode*

First, the connection between the main courses of structural design and management courses and production practice is not enough; second, the professional courses in the talent training program fail to effectively reflect the knowledge module construction requirements of 'general education module + subject basic course module + professional course module + practice and vocational skills module', and the score of practice and vocational skills module is low. Third, it fails to effectively construct the governance structure of industry and enterprise participation, so that it cannot fully participate in professional construction, personnel training and curriculum setting, etc., resulting in the cultivation of talents cannot effectively adapt to the needs of local industries (enterprises). Fourth, according to the change of education situation and the demand of social market economy for talents, we cannot adjust and enrich the teaching plan and syllabus constantly and adjust the ability training objectives to meet the needs of society.

#### *(2) There are limitations in the guarantee of teaching resources*

First, professional laboratories and off-campus practice bases cannot effectively meet the needs of students' classroom practice, production simulation practice and production line practice, and cannot comprehensively improve students' professional quality and comprehensive quality; second, due to the limited conditions of professional classrooms, some professional practice courses cannot be

organized by teaching while practicing. Professional practice courses such as CAD aided design, building materials, civil engineering construction cannot increase the intensity of teaching reform faster, resulting in students' weak hands-on ability.

*(3) The teaching methods are relatively old*

First, in the process of education and teaching, teachers pay more attention to theory than practice, pay more attention to knowledge than ability, and ignore the cultivation of students' engineering knowledge application ability, problem analysis ability, design and development ability, modern tool use ability and engineering evaluation ability<sup>[2]</sup>. Secondly, the development of teachers' teaching courseware, the compilation of applied teaching materials and the production level of teaching plan resources cannot keep up with the development of the situation. The teaching means of some courses are backward and fail to form a teaching resource system with matching theory and practice, multiple carriers and advancing with the times, and a teaching mode combining flexible and diverse teaching methods with advanced teaching means.

*(4) The teaching quality monitoring system is not rigorous*

Efforts are not enough to improve the teaching management system, broaden the teaching evaluation channels, enrich the quality control means, and achieve the continuous improvement of the teaching quality control system. Closed-loop management has not been formed in key links such as teaching plan management, teaching implementation process management and teaching quality management.

*(5) Bottlenecks in the Construction of Teaching Staff*

The teachers' teaching and scientific research team and innovation team are not effectively constructed, and the ability to serve social functions and solve engineering applications needs to be improved. In view of the school area and scientific research platform and other factors, there are difficulties in the introduction of high-level talents; there is a long way to go in cultivating a group of academic leaders with high level, strong business ability and strong organizational coordination ability.

### **2.3. Countermeasures and Measures for Constructing the Training Mode of Civil Engineering Specialty Characteristic Applied Talents in Local Applied Undergraduate Colleges**

The civil engineering specialty of Gannan University of Science and Technology was founded in 2004. In the course of nearly 20 years of running a school, the main task is to cultivate high-quality applied talents in the production ( service ) line of the construction engineering industry, continuously deepen the training mode of civil engineering professionals, and strengthen students' engineering practice ability and innovation ability.

*(1) Innovative talent training mode guided by market demand*

One is to explore innovative talent training mode. Making full use of the good opportunities of the university-industry cooperation base and the wide contact between the specialty and the society, the communication and contact with the cooperative enterprises are further strengthened. Through various ways such as ' co-construction base, ' ' joint research of science and technology, ' ' two-way part-time ' , ' work-study combination ' and ' professional comprehensive practice ' , the university-industry cooperation and collaborative innovation are carried out with 45 enterprises, and various forms of training modes such as school-enterprise talent training and order training are explored, and a scientific and reasonable talent training plan is constructed. Such as ' 3 + 1 ' school-enterprise talent training mode, the first three years in the school theory course learning, curriculum design and complete the practice link in the school, the fourth year to practice base, production-study-research base and collaborative innovation base, take professional teaching and site practice alternate way to complete the follow-up professional courses. At the same time, using the opportunity to study and

practice in the internship base, the graduation design is completed synchronously. The graduation design is guided by the professional teachers of the school and the engineering and technical personnel designated by the base. The teaching courses and internship syllabus of the fourth year are formulated by both schools and enterprises. The implementation of this training mode not only effectively improves students' professional knowledge and practical ability, but also strengthens the core competitiveness of students' employment.

Second, optimize the personnel training program. Insisting on taking the social demand as the goal, strengthening the professional theoretical basis, broadening the professional knowledge, adding the professional and interdisciplinary curriculum module, striving to achieve the whole process of quality education, the integration of theory and practice teaching, and then constructing the ability-knowledge integration training system of civil engineering specialty<sup>[3]</sup>. The whole curriculum system has 167 credits and 2296 hours. The distribution of each module curriculum and the credits of each part are shown in table 1.

Table 1: Time credit distribution table of each module

Course module category	Graduation credit requirements	Total class hours	The experimental hours	Proportion of total credits
Basic Socializing Course	59.5	1072	180	35.6%
Professional Education Curriculum	59.5	982	58	35.6%
Centralized Teaching Practice	33	-	-	19.8%
Comprehensive Quality and Innovation Education	15	240	0	9.8%
Total	167	2296	238	100%

Third, construct the innovation ability system of college students. Based on the "three mechanics" course, the structural model and mechanics competition of civil engineering specialty is planned to cultivate students' self-innovation consciousness, design thinking potential, engineering practice quality, team cooperation spirit and group strategy ability, which provides a good platform for students to comprehensively apply book knowledge to practice.

*(2) Improving curriculum system and teaching methods for the purpose of improving classroom teaching quality*

One is to strengthen curriculum construction. Taking the course construction as a breakthrough, the teaching resources are restructured, the course content and structure are optimized, and the reform of teaching content and teaching method is promoted.

Second, promote the reform of teaching methods. In line with the principle of "students as the main body and teachers as the leading role," the dominant position of students in teaching activities is highlighted in classroom teaching, so that students can find, explore, discuss and solve problems through classroom activities. Teachers use flexible and diverse teaching methods such as heuristic, discussion, research and case method to create an environment and atmosphere that is easy to think actively in classroom teaching, and strive to mobilize students' consciousness and enthusiasm for learning, so that they can acquire knowledge in active and positive thinking activities, master learning methods and improve teaching effectiveness.

Third, promote the reform of teaching methods. While improving the course content system and teaching methods, we should actively carry out the reform of teaching methods.

Fourth, promote the reform of examination content and methods. On the basis of meeting the teaching outline of the course, the examination contents should pay attention to cultivating students'

ability to solve practical problems with the knowledge they have learned, cultivating students' innovative consciousness and spirit, and promoting the coordinated development and comprehensive improvement of students' knowledge, ability and quality. So that students from 'want me to learn' passive learning state into 'I want to learn' positive attitude, students' entrance examination rate and employment satisfaction feedback rate increased year by year.

*(3) Improving the teaching management system based on updating the teaching management concept*

Based on the concept of OBE, establish and improve various rules and regulations, strengthen teaching management, explore the reasonable operation mechanism of teaching management, and further improve the teaching management level. At the same time, we should give full play to the supervision functions of the "steering committee for specialty construction" and the "teaching supervision group", improve the system of professional leaders, further standardize the teaching behaviors in classroom teaching, practice and experimental teaching, and construct an effective undergraduate teaching quality monitoring system, so as to provide guarantee for the teaching management system in specialty reform<sup>[4-5]</sup>.

*(4) Strengthening the cultivation of practical ability by focusing on the construction of laboratories and practice bases*

The first is to strengthen the construction of laboratories and practice bases. By means of enterprise investment and school self-financing, the laboratory construction and practice base construction of the school are strengthened, and the hardware conditions of the laboratory and practice base are constantly improved to create good experimental conditions for experimental teaching and teaching practice. At the same time, on the basis of consolidating and developing the teaching function of the existing practice base, the new practice base is further expanded, the school-enterprise cooperation platform is built, and the senior technical and management personnel of the enterprise are invited as part-time teachers of the specialty, so that the specialty becomes the technical support of the regional related enterprises, and the related enterprises become the teaching and scientific research practice base of the specialty.

Second, improve the practice teaching content. While ensuring the basic backbone courses of civil engineering specialty, the proportion of practice links should be appropriately increased, and the hours of characteristic courses such as professional test, engineering application software operation, professional cognition practice and part of engineering structure curriculum design should be increased. According to the curriculum system of school-enterprise talent training mode, the school and enterprise jointly prepare the teaching materials of relevant practical courses, and formulate the corresponding practical teaching syllabus. In practical courses with good foundation or courses with practical links, 1 – 2 courses are selected to focus on the construction according to the requirements of excellent courses, thus driving the rapid development of the curriculum construction of the whole practical curriculum system. Comprehensive, design and innovative experiments are added to strengthen the cultivation of undergraduates' practical ability and innovation ability.

Third, strengthen practical ability training. Combined with the basic quality of contemporary civil engineers should have, establish a scientific practice teaching system. Through the combination of school experiment teaching with practice teaching and practice in practice base, students' horizons are developed, students' ability to analyze and solve problems is cultivated, and students' practical operation and experimental skills are continuously improved. Encourage students to explore and study in practice, cultivate students' innovative thinking consciousness, and improve students' employment competitiveness. Taking engineering problems in enterprise production as graduation design topics, the proportion of students' "doing real problems" is increased, and students' ability and responsibility to solve engineering problems are strengthened.

*(5) Building a high-level teaching staff based on professional deepening reform*

First, optimize the structure of teaching staff. Combined with the needs of discipline construction, we should further optimize the structure of academic origin and knowledge structure, introduce and cultivate academic leaders and academic backbones, improve the proportion of master and doctor of professional teachers, and comprehensively improve the knowledge level and professional quality of teachers. Relying on the school's advantages and social reputation, it attracts experts and scholars from domestic and foreign universities and industries to work part-time in schools and establish a full-time teacher pool.

Second, increase teachers' professional ability. It is planned to send professional backbone teachers to famous universities at home and abroad for further study or visit, to the production practice of production-study-research base, collaborative innovation base and related industries, jointly carry out scientific and technological research and development of practical technology and products in construction projects, and solve engineering technical problems<sup>[6]</sup>;

Third, strengthen the training of young teachers.

The fourth is to explore the reform of the evaluation and evaluation system of professional teachers. The evaluation and evaluation of teachers have shifted from focusing on the evaluation of theoretical research and paper publication to focusing more on the output of applied achievements such as the construction practice of disciplines and specialties and the application of engineering project achievements, which greatly mobilizes the enthusiasm of teachers in engineering practice teaching and reform.

### 3. Conclusion

As an important part of higher education in China, application-oriented local colleges and universities need to carry out positive changes in the talent training mode of civil engineering specialty under the background of the implementation of new engineering. In the implementation process, we should focus on the cross integration with other emerging disciplines and technologies, complete teaching practice system, quality monitoring system and resource guarantee system. In view of the fact that the concept and standard of new engineering are still in exploration and practice, how to better focus on the five new development concepts of 'new concept, new structure, new mode, new quality and new system', and then continuously innovate and improve the training mode of applied talents with characteristics of civil engineering specialty needs further research to cultivate high-quality applied talents to meet the needs of industrial transformation and upgrading and public service development.

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