

Curriculum System Construction of New Engineering Specialty in Application-oriented Colleges and Universities

Zhu Guangliang, Wang Shu
Xi'an Peihua University
P. R. China

Abstract—The construction of curriculum system is an important part of the construction of new engineering specialty. Applied undergraduate colleges and universities should grasp the characteristics of training new engineering talents, and complete the construction of curriculum system based on their own reality and the needs of regional economic development. Based on the training of new engineering talents, this paper discusses the construction of curriculum system from three aspects: the establishment of curriculum system construction goal, the composition of curriculum system structure and the construction of curriculum content, which provide a solution for the construction of new engineering specialty curriculum system in applied colleges and universities.

Keyword—applied undergraduate colleges and universities; new engineering specialties; curriculum system; build

I. INTRODUCTION

With the rapid development of artificial intelligence, cloud computing, Internet of things, big data and other science and technology, human productive forces and relations of production are constantly changed, and the scientific and technological revolution and industrial reform are promoted. Human development and transformation are more active in the field of engineering technology, and have achieved unprecedented development. The traditional engineering discipline has evolved step by step into a new engineering subject with the meaning of "new and developing", "new type" and "newborn" [1]. Among them, "new and developing" refers to a new discipline, unprecedented, belonging to the world, mainly from other disciplines born; "new type" refers to the upgrading of traditional disciplines and the expansion of the connotation of disciplines, belonging to learning; "newborn" refers to the interdisciplinary fusion, including the product of cross-integration between engineering disciplines and other disciplines, which is the trend of modern industrial development, belonging to the common consanguinity and taken as the inheritance and development. The subject of new engineering has the characteristics of leading, blending, innovative, crossing and developing [1]. Grasping these characteristics is the premise of building new engineering.

The Ministry of Education attaches great importance to the construction of new engineering subjects, plans the reform of engineering education in an all-round way from the aspects of national strategic development, international competition and building people, explores the path of new engineering construction with Chinese characteristics, and provides a

Chinese plan for the reform of engineering education in the world [2]. The construction of new engineering subject must be different from the construction of traditional engineering discipline. It must be guided by "industry and future demand", expand the vision of interdisciplinary integration, and lead the development of industrial industry with service satisfaction and support. For the construction of new engineering, colleges and universities should select correct engineering types, excavate and integrate their own resources, and carry out engineering construction according to their own advantages. Most of the applied undergraduate colleges and universities are newly-built undergraduate colleges, with local general colleges and universities as the main ones, which should be based on the construction of "new type" engineering, and based on the development of regional economy, we should take local and application-oriented, expand the internationalization, and make efforts in the training of personnel training, education and teaching, scientific research and so on. As an important content of the construction of the new engineering specialty, the course system construction is the key to the construction of the course, with the emphasis on the construction of the characteristics, the economic development of the service area and the national strategy and the needs of the future talents, and the characteristics of the region and the characteristics of the school running are highlighted.

II. ACCURATELY GRASPING THE CONSTRUCTION GOAL OF THE CURRICULUM SYSTEM OF NEW ENGINEERING SPECIALTY

When carrying out the reform of education and teaching, colleges and universities take the reform of curriculum system and curriculum content as the important content, in which the curriculum system is the main carrier of talent training, the bridge of realizing the goal of talent training and the idea of education, and the embodiment of the goal of training. A professional curriculum system consists of many courses, which are composed of specific curriculum outlook, curriculum objectives, curriculum content, curriculum structure and curriculum activity mode, and are the sum of teaching contents and processes. Applied undergraduate colleges and universities must grasp the training goal and science in the course system of new engineering. They should set the curriculum view, define the curriculum objectives and contents, and carry out the order of educational and teaching activities. At present, applied undergraduate colleges and universities take the service of regional economic and industrial

development and the future growth of students as the starting point of curriculum system construction, take the growth of students as the center, according to the national and industrial standards, formulate school standards, pay attention to the integration of industry and education, carry out professional certification, and improve the education and teaching system.

In the course of the construction of the curriculum system of the new engineering specialty, it is necessary to keep up with the social needs and the future development needs of the students, integrate the educational concepts such as quality education, innovative entrepreneurship education and lifelong learning education into the new engineering construction, scientifically deal with the external requirements of the social demand, and scientifically handle the relationship between the intrinsic knowledge value of the subject and the Noumenon value of the students' future development. It can not only promote the development of subjects, but also realize the all-round development of students' ability and quality. Therefore, in the setting of the goal orientation of the curriculum system, we should grasp several aspects of "educating people", "applying", "frontier" and "evaluating".

Firstly, the curriculum system should grasp the core of "educating people". Colleges and universities generally have three functions: personnel training, scientific research and serving the society. Among them, talent training is the core function of colleges and universities. When setting up the curriculum system, it is necessary to highlight this core of "educating people", integrate the concept of human development into the curriculum, emphasize student-centered, adhere to the socialist direction of running a school, firmly establish the thought of building up people, and train students to have the ability of innovation and entrepreneurship and cross-border integration. High-quality compound excellent engineering and technical personnel has really become qualified socialist constructors and successors. Therefore, in the construction of curriculum system, we should respect Students' subjective creativity, and we should not only consider the graduation and employment of students, but also consider the lifelong development of students, so as to lay the foundation for students to adapt to the future social development and lifelong learning.

Secondly, the curriculum system should grasp the key of "applying". Curriculum system is an open system, which is closely related to social development, transmitting and replicating social culture, reflecting the indistinguishable nature of social development, and the listed knowledge must be able to be applied to the actual social production activities, which determines the application of curriculum construction. "applying" is the basis of the training of new engineering talents. The curriculum system must involve the personnel of industrial industry, achieve the integration of industry and education, strengthen the education of innovation and entrepreneurship, solve the problem of disconnection between talent training and market application, and can adopt order training with enterprises to ensure the availability of trained people. In application It is necessary to focus on the regional economic and industrial development needs of the province and city, and keep up with Belt and Road Initiative's

"intelligent manufacturing" and other national strategies and related fields of emerging industries.

Thirdly, the curriculum system should grasp the "frontier" of the future. With the development of science and technology, new engineering departments will continue to produce new specialties driven by artificial intelligence, big data, cloud computing, block chain and other technologies. We must examine the construction of new engineering curriculum system from the perspective of development, not only imparting the existing subject knowledge, but also reflecting the interdisciplinary integration and frontier development. Establish a dynamic curriculum system that keeps pace with academic and industrial frontiers, strengthen international exchanges and cooperation, cultivate students' international vision, and absorb the latest developments and research results in the field of engineering.

Finally, the construction of curriculum system should grasp the guarantee of "evaluating". As the closed loop of curriculum system construction, it is necessary to establish and perfect the evaluation system. Using evaluation to promote the construction of curriculum system and promote the development of specialty is the test of the effect of curriculum system construction. In the construction of new engineering, the evaluation of curriculum system is regarded as an important part of the evaluation of the construction of new engineering specialty. Guided by the application of talents in the employment market, the national standard, industrial standard and school standard of training quality of new engineering talents are used to measure and evaluate the curriculum system. The feedback of evaluation results is applied to the construction of curriculum system, and the continuous improvement to meet the needs of talent training and industry. The curriculum system of.

III. SCIENTIFICALLY ESTABLISH THE COMPOSITION OF THE CURRICULUM SYSTEM OF NEW ENGINEERING SPECIALTY

Colleges and universities in developed countries revolve around the construction of multi-objective curriculum system, set up courses and projects across disciplines, strengthen practical teaching and reform the curriculum adjustment and reform of general education curriculum system and teaching content [4]. Here is the problem related to the curriculum structure, the curriculum structure is the sequence structure of curriculum implementation, which determines what kind of knowledge structure students obtain, is the bridge between curriculum objectives and educational and teaching results, and is an important content related to the effectiveness of all education. The existing university curriculum structure is generally composed of general education courses, subject basic courses, professional direction courses and practical courses and links. The curriculum system can be divided into new engineering majors in the construction of new engineering majors. For general education, professional education and practical links, general education includes general basic courses and subject professional foundation, professional education includes professional core courses and professional expansion courses, and practice links run through the whole process of talent training [5]. Fig. 1 gives a schematic diagram

of the engineering specialty curriculum system. In the curriculum design, we should grasp the curriculum structure

scientifically and set the proportion of curriculum structure reasonably.

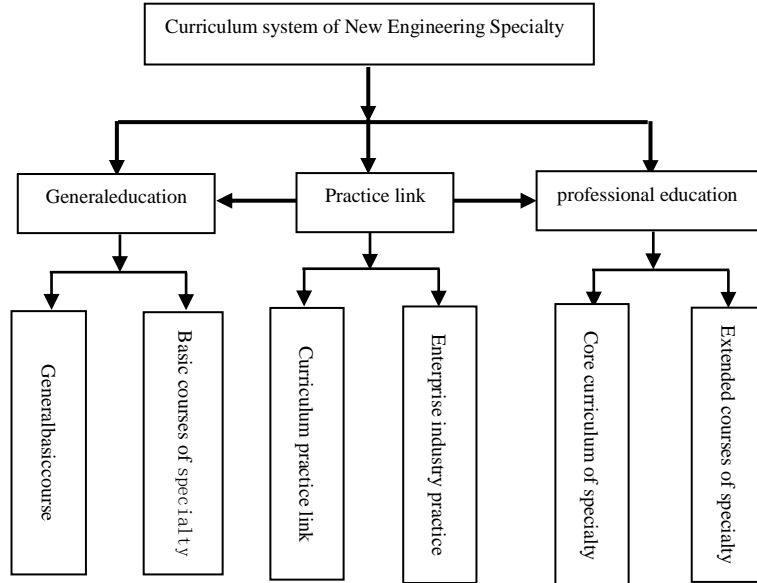


Fig. 1 Curriculum system for new engineering majors

The course of general education is the basic course of students' future work and life, which covers the basic accomplishment of being a person and the basic accomplishment of the subject, and it is a course that can be offered together by a large category of subjects. When offering general education courses in applied colleges and universities, we should fully consider the future development and industrial needs of students, not only traditional humanities, mathematical basic education, but also subject basic frontier education, imparting knowledge, and paying more attention to the cultivation of methodological habits. The basic course of general knowledge adopts modular teaching, which is divided into humanities module and mathematical module. The humanities module is composed of humanities, social science, management, thought and politics, military physical education, methodology and so on. The mathematical module mainly offers the courses of mathematics, probability statistics, computer foundation and so on, so as to lay down the basic knowledge needed in engineering practice and cultivate students' digital thinking ability. General education is the beginning of students to become excellent engineering talents by laying a solid foundation of major, cultivating students' humanistic literacy, innovative consciousness, team consciousness, social responsibility, global vision and so on. The basic course of subject specialty is based on the future industrial development, and the technological progress provides the subject and professional foundation for students. It is a basic course shared by major specialties. When setting up, it is necessary to cultivate students' engineering consciousness, systematic thinking, critical thinking and digital ability. Important considerations.

Professional education is a means to reflect the professional skills of subjects. In applied colleges and universities, it is a course that teaches students to be competent for work. This kind of course should not only teach students "learn", but also

let students "use". More importantly, it can support the future professional development. The professional core course should be made into excellent course, which has strong systematicness, directivity and comprehensiveness, should be closely combined with practice, and pay attention to the cultivation of students' ability to solve complex engineering problems, application and development ability, multi-disciplinary cooperation ability and innovation ability. The course of professional expansion is the expansion of the core course of specialty, which provides a professional training platform for the development of students' career and personality. The research on new technology and future industrial development can expand students' professional vision, cultivate students' ability to adapt to social dynamic development, leadership and global competence, and so on.

The practical link is the guarantee to improve the students' cognitive ability and professional application ability. The curriculum practice link is to run through the whole course learning stage, combine the knowledge transfer and the ability transformation closely, establish the student-centered practical curriculum system, deepen the understanding of the basic knowledge, and improve the students' ability to apply knowledge. In the spare time, especially in winter and summer vacation, we should carry out social practice activities, deepen students' understanding of society, understand new technology, new business type and improve their social cognitive ability. Take the special time to carry on the professional practice and the degree thesis work, let the student go to the enterprise profession front-line practice, learn to use the professional knowledge to solve the reality problem.

In the curriculum structure, we must deal with the relationship between courses and the proportion of courses to ensure the realization of talent training goals. To deal with the relationship between general education courses and other courses, to ensure the establishment of moral education, to train qualified socialist builders and successors, to deal with the

relationship between basic courses and specialized courses, to build a platform for basic courses, to implement the platform of basic courses, to realize interdisciplinary and professional association, to build a platform for inter - linked courses such as general courses and professional orientation courses. The future development of students provides the necessary knowledge and ability breadth, and lays a solid foundation for students' lifelong learning. In order to meet the development of commonness and individuality, in addition to the required courses, other courses are equipped with compulsory courses and elective courses, which deal with the proportional relationship between the two courses and implement modular elective courses, and also pay attention to the proportional relationship between theoretical courses and practical courses, so as to realize the integration of theoretical courses and practical courses. It is also necessary to coordinate the relationship between in-class courses and extracurricular courses, give full play to the role of modern technology in talent training, let students make good use of modern educational and teaching resources such as micro-class and MOOC class, and cultivate students' autonomous learning ability.

IV. REASONABLE CONSTRUCTION OF THE CURRICULUM CONTENT OF NEW ENGINEERING SPECIALTY

Curriculum content is an important carrier to achieve curriculum objectives. To a certain extent, the choice of curriculum content determines whether the curriculum system is scientific and reasonable, and whether it can achieve the goal of talent training. The construction of the curriculum of the new engineering specialty needs to strengthen the interdisciplinary integration and highlight the "new" characteristics; strengthen the integration of the curriculum, close to the new technology, new business type, integrate and reorganize the curriculum content, the curriculum can system the professional connotation; implement the modular curriculum, a course is no longer a teaching material in the traditional sense, and the related content is integrated into a module. These requirements make up the teaching content of each course of the new engineering major to be effective, stable and systematic. And frontier [5] and other characteristics.

In the curriculum content setting, we should select the relevant content around the four characteristics. The effectiveness of the teaching content is to pay attention to the application, to solve the problems of students' career development and lifelong learning, including the basic laws, basic principles and basic skills, which is indispensable and irreplaceable. Stability is related to the specific subject itself, is the basic knowledge of the subject, is not easy to age, and can play a long-term role in the future career of students. Systematicness requires that the content of each course is relatively independent, is a complete system, with its own characteristics, not only reflects the basic principles, methods and skills, but also can be integrated into the latest development. Frontline is advanced, The most advanced and leading knowledge and skills of the subject and related disciplines should be reflected in the course content, to expand the field of students' professional field and to follow the professional development of the subject.

V. CONCLUSION

According to the needs of regional economic development and personnel training, applied colleges and universities must scientifically establish the specialties to be built in new engineering subjects, apply artificial intelligence and other modern science and technology to professional construction, and give full play to the advantages of local enterprises and industries to carry out joint construction of new engineering majors. The construction of curriculum system must be close to the goal of talent training, set up the curriculum system scientifically according to the talent training scheme; establish the curriculum system structure suitable for students' future development and lifelong learning, correctly handle the proportional relationship between general and professional courses, required courses and elective courses, as well as theoretical and practical courses; reasonably construct the curriculum content to ensure the effectiveness and stability of the teaching content. It realizes the maximization of the benefit of curriculum system construction and promotes the continuous improvement of the quality of talent training in colleges and universities.

ACKNOWLEDGMENT

This work was financially supported by:

Research on the Reform of Education and Teaching at the School level in Xi'an Peihua University. The Construction of the Curriculum system for the training of Applied talents in New Engineering (Grant No. PHY1801).

REFERENCES

- [1] Lin Jian. The Construction of China's New Engineering Disciplines for the Future[J]. Research On Education Tsinghua University. 2017(2):26-35. (In Chinese)
- [2] http://www.hie.edu.cn/view_12582/20180330/t20180330_993779.shtml
- [3] Cui Ying. Research on the Construction of Curriculum system in Colleges and Universities[J]. Higher Education Exploration. 2009(3):88-90. (In Chinese)
- [4] Lin Jian, Hu Dexin. Comparison and Reference of the International Engineering Education Reform Experience[J]. Research in Higher Education of Engineering. 2018(2):96-110. (In Chinese)
- [5] Lin Jian. New Produced Engineering Specialty Construction with Multidisciplinary Cross and Fusion[J]. Research in Higher Education of Engineering. 2018(1):32-44. (In Chinese)
- [6] The Innovative and Entrepreneurial University; Higher Education, Innovation and Entrepreneurship in Focus[EB/OL]. (2014-01-01)[2017-12-26]. <https://www.com-mer-ce.gov>.