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Research on the Development of Core Curriculum System of Civil Engineering Major under the Background of "The Belt and Road"

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Abstract: Based on the strategic background of "The Belt and Road", this paper analyzes the docking relationship between vocational education and vocational training and the industrial and economic development of the countries along the "The Belt and Road". Based on the concept of the integration of middle class and education in vocational education, the core curriculum system of civil engineering major suitable for China-Africa cooperation in running schools is designed in detail, which provides a basis for the setting of subsequent personnel training programs and curriculum standards, and strives to be practiced and applied in the promotion of the project.

Keywords: Belt and Road; Luban College; Curriculum System; Civil Engineering Class

1. Introduction

"The Belt and Road" strategy is an inherent requirement of the reform of the global governance system and a new idea and plan to promote the reform of the global governance system. Civil engineering is the basic, leading and strategic industry of the national economy. As a vocational educator [1], this paper studies the education and teaching of civil and architecture-related courses as the carrier, takes Tanzania as the pilot and starting point, and seeks cooperation with countries along the route to promote the implementation of education and teaching step by step, grasp the achievements of cultural integration bit by bit, and implement the national strategy [2]. Further research is carried out on the construction of higher vocational civil engineering curriculum system, focusing on the analysis of core curriculum construction objectives, adhering to the concept of openness, coordination, cooperation, innovation and development, integrating resources, seeking coordinated development of vocational education and industry, and further leading vocational education to respond to "The Belt and Road"[3].

2. Research on the Strategic Background of "The Belt and Road" Initiative

Since "The Belt and Road" Initiative and strategy were put forward, vocational education cooperation between countries along the routes of China and Africa has gradually been put on the agenda. Since 2015, the China-Asean Vocational Education Joint Exhibition Forum held in Nanning kicked off a generation of prelude, "Cooperation to cultivate talents, promote the 'Belt and Road'" is the central topic of the forum, this activity is also one of the series of activities of the 12th China-Asean Expo, the purpose of the forum is to build a platform for international cooperation in vocational education. To strengthen cooperation between China and ASEAN countries in the field of vocational education; "The Belt and Road" Industry and Education Cooperation Summit was held in Beijing in October 2016, which launched the initiative and call for the establishment of the industry and education cooperation alliance, further providing opportunities and hotbeds for the in-depth development of industry and education cooperation in countries along "The Belt and Road". In June of the following year, the "Opening Ceremony of the Silk Road Education Cooperation and Exchange Conference under the 2017 Silk Expo" was grand opened in Xi 'an, and "The Belt and Road" vocational Education Alliance was officially established[4].

At the same time, we can also see that from the motion in 2015 to the initiative issued in 2016,

on June 9, 2017, "The Belt and Road" Industry and Education Collaboration Alliance was officially established in the eastern port of the "Maritime Silk Road" - Ningbo, Zhejiang Province, from 76 higher vocational colleges across the country, AVIC International and other 13 leading enterprises in different industries. And China Education Association for International Exchange, Non-ferrous Metal Industry Association, National Semiconductor Industry Alliance and other industry organizations joined the alliance. Indeed, in terms of number, there are more and more international cooperation platforms under the Belt and Road Initiative. However, from the perspective of operation, the depth of communication between countries along "The Belt and Road" through the international cooperation platform is still insufficient, and many of the cooperation is still limited to short-term visits and shallow cultural and technological exchanges, and the cooperation situation is still inseparable from lectures and study visits. There are still many problems in cooperative education, such as the ability to cooperate with enterprises to improve, the development of high-level international courses is not enough, the development and use of international curriculum system is blank, and the international vision of teachers needs to be broadened[5].

China's vocational education has formed a unique development paradigm of modern vocational education, the type of vocational education is scientific and clear, vocational school education and vocational training equal attention, vocational education and general education horizontal integration, different levels of vocational education vertical, serving the lifelong learning of the whole people's modern vocational education system is increasingly perfect. It can be said that our country's vocational education has entered a new stage of improving quality and increasing value. From top-level design to system standards, we have built a complete set of vocational education system with Chinese characteristics that runs through the whole process of students from enrollment to graduation, including examination enrollment, talent training, quality evaluation, internship management and degree system.

3. Research Significance of the Development of Core Curriculum System of Civil Engineering Major under the Belt and Road Initiative

For the construction of "The Belt and Road", the development of civil engineering is particularly important. For the development of "The Belt and Road" vocational education alliance and the in-depth implementation of the integration of industry and education, the construction of "The Belt and Road" civil engineering professional curriculum system, and then the application of the curriculum system for practical teaching are implemented and constantly revised in the "Luban College" project in Tanzania. It is not only the requirement of The Times to play the leading function of transportation, but also the practical need to serve the deep integration of vocational education and teaching in the construction of "The Belt and Road". "The Belt and Road" civil construction course design in a broad sense, including domestic construction, international construction and cultural construction of three levels. Among them, at the cultural level, we should focus on enriching China's international communication channels with transportation as the carrier, integrate into the cultural customs of countries along "The Belt and Road", take China's modern transportation system as the business card of China's modernization, interpret and transmit the concept of China's modern transportation culture by shaping and disseminating the image of China's transportation power, and show the national image. In a narrow sense, we urgently need to build a specific professional curriculum system, take "Luban College" as a pilot, combine with the actual needs of Tanzania's cooperative enterprises for talents, formulate relevant theoretical and practical training courses, and reasonably arrange courses and class hours, and actually practice the strategy of "The Belt and Road".

Different national conditions, different social needs, different educational concepts, domestic and foreign colleges and universities civil engineering courses are inevitably different[6]. How to seek common ground while reserving differences, learn from each other, give full play to the advantages of cooperative education, and better train modern engineers who meet the requirements of social development? While clarifying the training

objectives, it is necessary to distinguish the differences in the professional personnel training curriculum of the two parties. Based on this, cooperation and complementarity are carried out to achieve the purpose of personnel training.

4. Construction and Research of Core Curriculum System of Civil Engineering Specialty

In order to train and meet the needs of economic and social development of Tanzania, master the basic theories and knowledge of civil engineering materials, civil engineering design, water supply and drainage system design, wastewater and irrigation system design, hydraulic structure design, geotechnical investigation and test testing, engineering metrology, engineering bidding and other aspects necessary in the field of civil engineering. Have the ability of engineering design, geotechnical investigation and geotechnical test, engineering surveying, engineering cost and engineering bidding and bidding, have good professional quality, team spirit and communication skills, have a certain sense of innovation and entrepreneurship and lifelong learning ability, engaged in engineering design, measurement, investigation, testing and experiment of high-quality, high-skilled personnel[7].

The course of professional direction is directly related to the "expert" in which students become. Therefore, under the limitation of limited credits, the required courses for the major direction should be set up in a fine and detailed way. However, since the current social requirement for professionals is that they should be well-versed in their own majors and be able to solve related problems at the same time[8], they must have corresponding elective courses for the major direction to complement them, so as to ensure that students can learn the courses for the major direction. You can also gain an understanding of other related fields. The required courses and elective courses should not only consider the good overlap between the courses, but also avoid too much repetition between the courses. Take the civil engineering major of our college as an example, under the two directions of "construction engineering" and "underground engineering", Courses in concrete and masonry structure design, steel structure design and construction, seismic resistance of building structure, high-rise building structure design and construction and underground building structure design, geotechnical engineering investigation and testing, foundation pit and slope engineering, underground engineering construction technology are offered. In addition, 9 elective courses in the corresponding professional direction are offered, including industry-related technical courses, management courses and engineering software courses, such as seismic response time history analysis, environmental geotechnical engineering, elastic mechanics and finite element method, engineering bidding and bidding, urban planning, etc. Students can choose courses according to their interests.

The practice courses of domestic colleges and universities are mainly to observe and learn from the surrounding or cooperative enterprises, and for various reasons, students can not really participate in the practice of enterprises. We can learn from the practice of foreign colleges and universities to let students practice in enterprises as workers[9]. We can try to take a project as the basis, starting from theoretical basic courses in lower grades to practical problem-solving skills training based on theoretical knowledge in senior grades. We can arrange the curriculum reasonably and offer practical courses in each academic year. Through project-style learning, students can keep contact with the industry, ensure that students master theoretical knowledge, but also exercise the practical engineering operation ability, which is conducive to students to adapt to the requirements faster after entering the society.

In the future, the construction of civil engineering courses will rely on Luban Workshop, Skills Africa and other projects to gradually build "The Belt and Road" online education MOOC cooperation platform courses, build "The Belt and Road" course system with international characteristics and the online education cooperation MOOC platform suitable for common application, so as to realize the synchronization of classrooms and the sharing of teaching resources in domestic and foreign cooperative institutions. Actively create high-quality online shared courses and enhance the recognition of courses among institutions. Strengthen the

communication and exchange of online course development and implementation among international colleges and universities, and realize the recognition of online course credits[10].

Based on the above analysis, we set up the core curriculum system of civil engineering majors and described the curriculum(*e.g.*, **Table 1. Professional core curriculum description**).

Table 1. Professional Core Curriculum Description

Core	Course	Typical job description	Main teaching content
1	Construction of building project	1. Interpret the approved construction drawings; 2. Make construction organization design and special construction plan; 3. Select appropriate tools, equipment and safety protection devices; 4. Prepare construction materials for different projects according to approved material supply plan; 5. Project quality, schedule and cost control; 6. Conduct safety management and engineering data management;	Construction techniques of building projects (surveying and setting off, excavation, construction, etc.); Processing, binding and installation of steel bars, design, laying and removal of formwork, mix design, transportation, pouring, vibration and maintenance of concrete; Construction technology of indoor water supply and drainage pipeline (pay-off, installation, maintenance); Outdoor water supply and drainage pipeline construction technology (pay-off, excavation, installation, backfill, maintenance).
2	Building and civil engineering survey	1. Preparation of measurement technical design; 2. Site survey; 3. Select appropriate tools, equipment and safety protection devices; 4. Measuring, recording observation data, processing measurement data; 5. Compliance with health and safety precautions; 6. Preparation of measurement technical reports; 7. Clean equipment and work area;	Function, construction, application, debugging and installation of level, theodolite, total station and rangefinder; Distance measurement, principle and method of leveling, elevation setting and leveling; Observation of horizontal Angle and vertical Angle, measurement of horizontal point position and design horizontal Angle, tilt and displacement observation; The total station is used for construction measurement. 6. Preparation of measurement technical reports;
3	Route design	1. Geometric design of highway; 2. Pavement design; 3. Conduct railway design; 4. Preparation of construction drawings; 5. Clean equipment and work area; Store tools and equipment properly.	The determination of design parameters of road shape design, road horizontal alignment, longitudinal alignment, cross section elements, design of road intersections; Estimating traffic loads, evaluating subgrade characteristics, determining the limits of homogeneous cross sections, designing gravel pavement structures, asphalt pavement, concrete pavement, railway, etc.
4	Structural design	1. Design reinforced concrete (RC) building structures; 2. Design reinforced concrete (RC) retaining walls; 3. Design masonry walls; 4. Preparation of construction drawings;	Static system, design load, constant live load, live load determination, structural analysis, design of each concrete component; The force analysis of the retaining wall, the determination of the structure form and size of the retaining wall, the reinforcement calculation of the retaining wall, the stability and crack resistance checking calculation of the

			retaining wall; The determination of the load on the masonry wall, the force analysis, the determination of the wall material, the geometric size.
5	Engineering water supply and drainage design	1. Design water supply system; 2. Design water supply and waste water systems in buildings; 3. Design wastewater system; 4. Design irrigation system; 5. Design hydraulic structure; Preparation of construction drawings;	Determination of the type of water supply system and related design; The design of building water points, the number and placement of sanitary ware, water supply sources, sewage and rainwater discharge points and other parameters;

5. Peroration

In this paper, under the guidance of "The Belt and Road" strategy, the higher vocational civil engineering courses take "post ability training as the main line", highlight "practical and practical", and establish a curriculum system that ADAPTS to the training objectives. The content of the course focuses on the training of knowledge and practical skills. Through the training, students will further understand the knowledge of engineering drawing identification, measurement technology, construction technology, testing technology, software application, organization and management, improve the technical knowledge and management level of road and bridge construction, and serve the local senior management personnel of road and bridge construction in Tanzania.

In the future, based on the above analysis of the characteristics of civil engineering courses in domestic and foreign universities, while introducing excellent foreign resources, the following measures can be taken to carry out Sino-foreign cooperation in running schools, train international civil engineering professionals suitable for the development of modern society, and build a suitable professional curriculum system.

First, reduce ordinary courses appropriately. For such courses, the class hours can be appropriately reduced, and the reduced class hours can be carried out in the second class in the form of lectures, which can not only instill relevant ideas to students, but also arrange more time for future professional basic courses and professional courses, but also set up professional law, professional ethics and other general courses in combination with the strong practical characteristics of civil engineering. The second is to optimize the professional basic course group. In the whole curriculum system, the role of professional basic courses is huge, it not only lays the foundation for students to learn professional knowledge, trains students' analytical and computational ability, but also connects the knowledge of different professional directions. It provides a good platform for senior students to learn professional courses, and also provides a good buffer for students to self-study relevant professional knowledge in the future social practice process. Professional basic courses can be divided into theoretical lectures, experimental courses (such as physics, chemistry can offer experimental courses), course design, etc. The basic professional courses of civil engineering include descriptive geometry, drawing course and course design, engineering survey, soil and wood engineering materials, structural mechanics, engineering project management, etc.

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