

The Path Analysis of the Innovation and Development of “Civil Engineering Materials” Curriculum Under the Background of Sino-foreign Cooperative Education

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Abstract: Sino-foreign cooperative education has cultivated a large number of outstanding students with international vision for the country in recent years, and also provided a way for the innovative development of the Chinese side's curriculum. However, the differences between the Chinese and Malaysia sides in knowledge system, Teaching focus, assignment and other aspects have brought challenges to the innovative development of Chinese curriculums. This paper analyzes in depth the respective characteristics of the “Civil Engineering Materials” curriculum taught by Chinese and Malaysia sides, and draws on the advanced concepts of Malaysian curriculums to integrate and innovate the Chinese curriculum by stimulating learning motivation, cultivating autonomy, combine theory and practice, and strengthening communication between two sides, so as to provide theoretical support for the contribution of “Civil Engineering Materials” curriculum with obvious advantages, distinctive features and remarkable effectiveness.

Keywords: Sino-foreign cooperative education, Civil engineering materials, Innovation and development.

1. Introduction

Since entering the 21st century, China's economy has developed in leaps and bounds. “The belt and road” initiative and the “community of shared future for mankind” concept further promote our country's transnational investment, talent flow and cooperative production. With the increasingly close connection between China and the world, a large number of high-quality talents possessing international vision, familiar with international affairs and international working ability are needed. However, the higher education in China started late and has a thin foundation, and it has not been able to meet the development needs in the cultivation of international talents. Therefore, learning from foreign advanced educational experience and introducing foreign high-quality education resources for Sino-foreign cooperative education have become one of the important ways for the international development of higher education in China[1]. Until June 2022, the number of Sino-foreign cooperative education projects in Chongqing has reached 31[2]. Under this background, Yangtze Normal University and Universiti Sains Malaysia have jointly organized an undergraduate education program for civil engineering.

By introducing the advanced education concepts and high-quality education resources of the Universiti Sains Malaysia, the program of Civil Engineering (Sino-foreign cooperation) of Yangtze Normal University jointly cultivates talents with all-round development of morality, intelligence, physical, beauty and labor. After studying systematically the basic knowledge of theoretical mechanics of civil engineering, material mechanics, civil engineering materials, road and bridge engineering, etc., the talents master relevant construction machinery, engineering survey, construction organization and so on basic skills, have the preliminary design of civil engineering, construction, management and engineering quality test of basic skills, capable of housing construction, roads, bridges, tunnels and so on each kind of

engineering technology and management work, has the theory of solid foundation, wide professional knowledge, strong practical and innovation ability[3]. Among all curriculums, “Civil Engineering Materials” as a professional basic curriculum in the direction of civil engineering, gives students the ability to reasonably select and correctly use civil engineering materials in future professional and technical work[4]. However, in the process of serving as both Chinese curriculum teacher and Malaysia curriculum assistant in Civil Engineering Materials, the author found that the teaching content and curriculum system of the two sides were quite different, resulting in certain difficulties in the process of localizing foreign high-quality educational resources. This paper deeply analyzes the respective characteristics of the Chinese and Malaysia “Civil Engineering Materials” curriculums, and draws on the advanced experience of the foreign curriculums to integrate and innovate the Chinese curriculums in terms of stimulating learning motivation, cultivating autonomy, linking theory to practice, and strengthening Chinese and foreign exchanges, so as to form a Chinese curriculum of “Civil Engineering Materials” with obvious advantages, distinctive features and remarkable effectiveness.

2. Comparison of Teaching Characteristics of Chinese and Foreign Curriculums in "Civil Engineering Materials"

2.1. Ideological and Political Education

The Malaysian curriculum is completely taught in accordance with the original content, without ideological and political content. The Chinese curriculum has obvious advantages in this regard. The Chinese side digs deeply into the ideological and political education elements of the curriculum, combines knowledge imparting and value guidance, and has a clear awareness of educating people.

Sino-foreign cooperative education is to contribute a Chinese university, and the talents cultivated also serve the socialist construction of our country. Therefore, the concept of Sino-foreign cooperative education should be based on the education concept of Chinese side.

Table 1. Comparison of Chinese and Malaysian curriculum features

	Malaysian side	Chinese side
Ideological and Political Education	Not available	Available
Knowledge system	British Commonwealth	Chinese
Teaching focus	Dispersion	Prominent
Teaching mode	Online	Offline
Language Environment	English	Chinese
Lesson experiments	Open experiment	Confirmatory experiment
Assignment	Flexible	Fixed
Test difficulty	High	Low

2.2. Knowledge system

The Malaysian knowledge system is based on the British Commonwealth. Due to the development of its civil engineering technology for hundreds of years, the knowledge system is relatively mature, but the standards used are relatively old. China has developed rapidly in the field of civil engineering technology, and has formed an independent knowledge system with relatively new standards. Taking concrete mix design as an example, the Malaysian standard is BRE 1988, which has been used for 34 years, while the Chinese standard is JGJ55-2011, which has only been used for 11 years. The Malaysian curriculum does not specify textbooks, only provides reference books, and mainly relies on PPT to teach the curriculum content, while the Chinese side provides textbooks and reference books, and relies on PPT and textbooks to teach together.

2.3. 2.3 Teaching focus

The theory classes of Malaysian and Chinese are both 32 hours. Malaysian teaching focuses on the heuristic teaching of “teacher lectures less, students learn more”, relies heavily on students' learning autonomy, and encourages students to study on their own after class. Therefore, the content of the lecture is more superficial; the Chinese teaching is mainly based on listening to the teacher, and the focus of the lecture is more prominent, especially the teaching of key and difficult points is more in-depth, and the students are encouraged to review the points taught in class.

2.4. Teaching Mode

Due to the impact of the COVID-19 pandemic, Malaysian teachers are unable to teach live in China, so Malaysian curriculums are conducted online, and the curriculums can be recorded for students to watch and replay after class. The Chinese curriculums are all offline curriculums, and they can only be reviewed through textbooks and curriculumware after class.

2.5. Language Environment

Malaysian curriculums are taught in English, which can effectively exercise students' English proficiency. However, there is a big gap in the English foundation of the students,

and some teachers' spoken language has a strong local accent, which makes it more difficult for students to learn Malaysian curriculums. The Chinese curriculums are taught entirely in Chinese, which is highly accepted by students, but does not help to improve their English proficiency.

2.6. Classes experiments

Classes experiments of Malaysian and Chinese classes are both 16 hours, and the experimental time is relatively sufficient. The Malaysian curriculums include 4 confirmatory experiments and 1 open experiment, and the Chinese experiments are 5 confirmatory experiments. Confirmatory experiment is the process of completing accurate operation requirements in strict accordance with preset steps within the existing framework to obtain the expected experimental results, during which the experimenter can master some basic operation skills of the experiment [5]. The step design of an open experiment occupies a major position in the experiment. The step design depends on the experimenter's understanding of the purpose of the exploratory experiment. The experimenter needs to design the experimental steps and complete the operation through innovative thinking activities according to their own needs. Therefore, the open experiment can better exercise students' innovative thinking and practical ability.

2.7. Assignment

Malaysian assignments are mostly subjective and highly flexible. For example, one assignment is to ask students to go to the nearest hardware store which sells building materials and products, find 6 different types of materials or products, discuss material properties and its features/applications and take a photo with team members or individuals in front of the hardware store. The Chinese side mainly focuses on after-school topics, the content is relatively fixed, and the flexibility is low.

2.8. Final Exam

Malaysian education emphasizes “wide entry and strict exit”, and the final exam is more difficult than classroom lectures and assignment exercises. The exam has a large amount of questions, with a total of 6 major questions, of which 4 are selected to complete. Each question is relatively complex and includes case analysis and calculation content. The exam of Chinese side is the standard multiple choice question, judgment question, fill-in-the-blank question, noun explanation, short answer question and calculation question. The content is all the exercises after class and the focus of the curriculum, and the difficulty is slightly lower than what we have learned at ordinary times.

3. Improvement Measures

From the comparison of Malaysian and Chinese curriculum characteristics, we can see that each Chinese and Malaysian curriculums has their own advantages, and the Chinese curriculum wants to make innovative development, and can learn some advanced teaching experience from the Malaysian side to come out of a path of education with Chinese characteristics. Specific reference measures are as follows:

3.1. Stimulate students' learning motivation

There are various assessment methods for Malaysian curriculums, focusing on the combination of regular assessment and final assessment, and the usual assessment is

distributed throughout the entire curriculum learning process, urging students to have a solid grasp of what they usually learn and focus on the accumulation of ordinary knowledge. However, the Chinese curriculum assessment is mainly in the form of “examination+assignment+attendance+experiment”, and the final examination adopts the traditional closed book examination, and the score is relatively high (60%), which leads to some students not studying at ordinary times and cramming for the upcoming exam. Therefore, Chinese curriculums can actively learn from the assessment methods of Malaysian curriculums, increase the number of assessments and the proportion of grades, and strictly assess the curriculum process.

3.2. Cultivate students' learning autonomy

Cultivating students' autonomous learning ability is the requirement of high quality talents training and high level running school. The Chinese curriculum can not only introduce excellent Malaysian curriculums, textbooks and teaching staff, but also pay attention to the cultivation of students' learning autonomy in teaching methods. The first is to select the content of the curriculum, pre-class preview and after-class review to force students to study by themselves. Secondly, supplement the after-class materials and encourage students to study by themselves. Finally, correct students' habit of relying on teachers' answers, and cultivate students' ability to solve problems independently.

3.3. Combining theory with practice

Practical teaching is an important part of cultivating students' hands-on ability, innovation and creativity, and the ability to relate theory to practice. Therefore, the Chinese side can learn from the practice teaching model of Malaysian side and turn the confirmatory experiment into an open experiment. In terms of curriculum knowledge content, we should pay attention to the systematicness and connection of knowledge, stimulate students' ability to combine theory with practice, systematically master and comprehensively apply knowledge, and try our best to cultivate the ability of learning, life and learning.

3.4. Further strengthen Sino-foreign communication

At present, the teachers of Chinese side only maintain relatively close contact with Malaysian co-curriculum teachers, and do not communicate extensively with other teachers. The Chinese side can further expand the scale and scope of cooperation with Malaysian parties in the aspects of

cooperative education and scientific research exchanges. The communication between Chinese and Malaysian teachers can not only rely on teachers' consciousness and initiative, but also need to create a powerful platform at the college level and actively play the role of “push hands”.

4. Conclusion

In conclusion, with the increasingly close connection at home and abroad, the coordinated development of Chinese and foreign innovation will become one of the important development trends of my country's higher education in the future. To build a “Civil Engineering Materials” with obvious advantages, distinctive features and remarkable effectiveness, it is necessary to actively innovate the methods and means of teaching work, closely combine the internationalization background of the new era, innovate teaching concepts, explore teaching resources and elements, optimize teaching methods and dissemination channels, continuously consolidate the teaching system in the context of multiculturalism in the new era, and then improve the quality and effectiveness of teaching work.

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