



Research and Practice on the Construction of Emerging Engineering Education Community from the Perspective of "Belt and Road"

Ling Lu¹* and Xing Chen, Peng Li, Wenwu Li, Haifeng Liao

China Three Gorges University, College of Electrical Engineering and New Energy, 443002,
Yichang, Hubei, China

*luling@ctgu.edu.cn

Abstract. Focusing on the demand of the "Belt and Road" construction and "Emerging Engineering Education(3E)" development, the formation of the "Belt and Road" engineering university strategic alliance and the construction of the international cooperation network of engineering education is discussed in this paper, which can effectively enhance the international influence of China's engineering education and enhance the supporting role of engineering education for China's national strategy. Promoting interdisciplinary integration through the construction of "3E" community, adapting to the related majors development in strategic emerging industries, encouraging university teachers to participate in international exchanges and cooperation, so to expand international horizons, and promote the international development and professional ability. Through the implementation of cooperation in education between universities and enterprises serving the "Belt and Road", more engineering talents for the "Belt and Road" will be cultivated so as to promote the integration of production and education. In the paper, the strategy of continuously building international higher education community is put forward, which promotes the modernization of engineering education governance system and the innovation of talent training mode through the construction of Emerging Engineering Education community.

Keywords: "Belt and Road"; Emerging Engineering Education; International university education community; Higher education exchange and cooperation

1 Introduction

Under the overall "Belt and Road" construction strategy, promoting regional cooperation and development in higher education among these countries and building the "Belt and Road" higher education community are inevitable trends for deepening understanding and recognition among the countries, nations, and cultures along the route, as well as for enhancing the integration and internationalization of higher education in these countries. In the paper, "Belt and Road" strategy and long-term impact over education system is illustrated briefly, followed by the description on significance, properties, implementation plans of Emerging Engineering Education(3E) and Higher

Education Community(HEC) construction. Then taking China Three Gorges University (CTGU) as the example of construction of Emerging Engineering Education and HEC, some models and practices are demonstrated. After that, some effectual strategies for continuous construction of Higher Education Community is provided in this paper.

2 Background of the "Belt and Road" Strategy

More than ten years since the "Belt and Road" Initiative was proposed, China has signed over 200 cooperation documents on jointly building the Belt and Road with 151 countries and 32 international organizations. Together with relevant parties, China adheres to the principle of consultation, joint contribution, and shared benefits, deepening mutually beneficial cooperation and achieving substantial and significant construction achievements^[1].

As a major measure for China to expand its opening-up, the 'Belt and Road' initiative has opened a new chapter in China's and the world's economic development, and is currently the world's largest international cooperation platform and the most welcomed international public strategy.

According to the global public opinion survey of Cambridge University, China 's positive evaluation in the "Belt and Road" countries is 62 %, and its influence continues to increase. The World Bank 's 2019 research report shows that if the transportation infrastructure projects under the "Belt and Road " framework are fully implemented, they are expected to bring global benefits of \$ 1.6 trillion per year by 2030, accounting for 1.3 % of the world economy^[2].

At present, the prospect of world economic recovery continues to be sluggish, and the role of the " Belt and Road " in promoting economic growth in relevant countries and regions and promoting common global development is more important. The brilliant achievements over the past decade have fully demonstrated that the joint construction of the " Belt and Road " meets the needs of world development and conforms to the expectations of the international community. The quality of cooperation is getting higher and higher, and the development prospects are getting better and better.

3 Construction of Emerging Engineering Education(3E)

The concept of 'Emerging Engineering Education' (3E) was proposed in 2016. Within less than a year, China Ministry of Education(MoE) organized universities to conduct in-depth discussions, resulting in the 'Fudan University Consensus' and the 'Tianjin University Action.' Higher engineering education in China still faces several issues in cultivating excellent engineering talents, such as educational philosophy, talent structure, knowledge system, and training models^[3].

Emerging Engineering Education is a direction for China's engineering education reform proposed based on the new demands of national strategic development, the new situation in international competition, and the new requirements of moral and intellectual education. Clearly, Emerging Engineering Education is not a local consideration but a major strategic choice for engineering education reform under the back-

ground of the new technological revolution, new industrial revolution, and new economy, which represents a new way of thinking and approach for the future development of engineering education in China.

3.1 The Connotation of Emerging Engineering Education(3E)

1)New Concept: Guided by the goal of fostering virtue through education, Emerging Engineering Education emphasizes more on actively responding to changes and proactively shaping the world.

2) New Requirement: Based on new talent structures and quality standards, it aims to cultivate future diversified, innovative, and excellent engineering talents. As a form of Emerging Engineering Education education, its essence of educating people has not changed, but the requirements for talent cultivation have evolved. The structure of engineering talent cultivation requires diversification, and the quality of engineering talent cultivation needs to be future-oriented.

3)New Approach: Emerging Engineering Education reflects the form of future engineering education. It is an innovative engineering education program that progresses with the times, requiring the adoption of construction approaches and measures that integrate inheritance and innovation, interdisciplinarity and integration, and coordination and sharing.

3.2 The Characteristics of Emerging Engineering Education(3E)

1) Strategic type: Emerging Engineering Education not only emphasizes problem orientation, but also emphasizes strategic orientation. For better 3E construction, everyone must speed up the transformation of ideas with strategic vision and thinking, and deepen the reform of education. It should not only train talents to support the transformation and upgrading of traditional industries, but also to support the cultivation and development of new industries and other future needs.

2) Innovation type: Innovation is a vital and inexhaustible motive force for the development of engineering education. The implementation of 3E should embody the needs of economic and social development in every domain of talent training, carry out innovative changes around the industrial chain and innovation chain from the aspects of construction concept, construction goal, construction task and construction measures, and reshape engineering education.

3) Systematization: The construction of Emerging Engineering Education is a systematic project. Firstly, we need to actively respond to social changes and needs from a systematic perspective, and take the cultivation and development of 3E and the transformation and upgrading of traditional engineering as a system to design a complete plan for education, research, practice, innovation and entrepreneurship, so as to continuously provide new impetus for the reform and development of engineering education^[4].

4) Open type: Emerging engineering education is a higher level of open engineering education. We should promote reform and innovation by opening up, strengthen international exchanges and cooperation with foreign countries, promote the opening of

engineering education resources and education governance internally, and accelerate the formation of a co-construction and sharing pattern of deep integration of opening up and internal opening up.

3.3 The Implementation Plan of Emerging Engineering Education (3E)

The action route of Emerging Engineering Education construction focuses on China national strategic goal and puts forward the action plan of "three stages, three tasks and three breakthroughs", shown as Fig. 1.

Engineering education must aim for world-class standards, embracing the overall concept of 'Emerging Engineering Education' to meet the new situation and new tasks where multiple strategic opportunities and challenges coexist, providing strong talent support and intellectual backing for the country's economic transformation and social development.

In the process of building Emerging Engineering Education, it is necessary to introduce high-quality international educational resources, collaborate with relevant experts to jointly develop courses, share faculty, and co-research projects, promoting a curriculum system that aligns with international frontiers.

The establishment of an International Alliance for Emerging Engineering Education, organizing international engineering education development conferences, and constructing an open communication mechanism integrating government, universities, industry, and international organizations, will, through the continuous dissemination of the 'Chinese voice' in engineering education and the promotion of the 'Chinese model,' gradually enhance China's ability to attract, gather, and cultivate top engineering talent on a global scale.

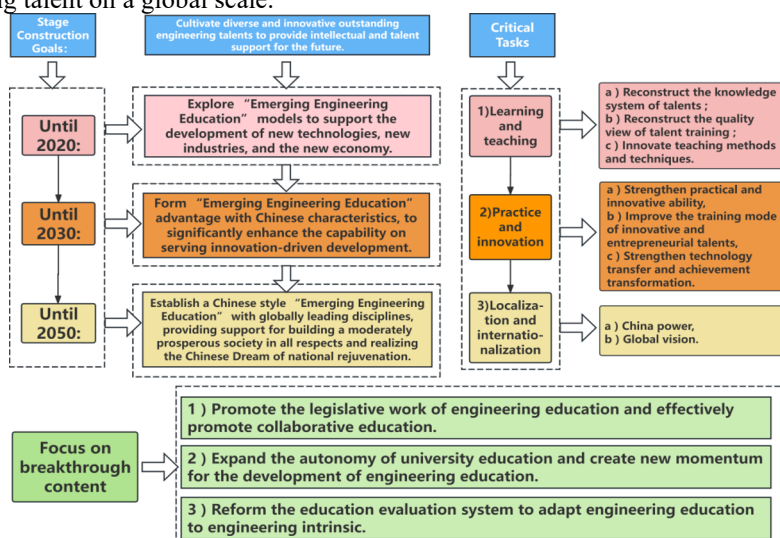


Fig. 1. Emerging Engineering Education construction goals, tasks, contents

4 Construction of Higher Education Community

To construct and implement the "Belt and Road" strategy successfully, it is necessary to form a pattern of mutual appreciation, understanding, and respect among the people in the countries along "Belt and Road". Promoting the construction of International university alliances is beneficial for establishing exchange platforms and mechanisms among universities, broadening the content and channels of higher education exchange and cooperation in countries jointly building the "Belt and Road," enhancing trust and integration among different cultures, and forming a harmonious and inclusive cultural pattern. Therefore, based on theoretical research related to International university alliances, the governance practices of international university alliances are analyzed in the context of the "Belt and Road" and further explores effective strategies to deepen the development of these university alliances.

4.1 The Significance of Construction on Higher Education Community

The "Belt and Road" Higher Education Community is a new concept and model of joint development built on the principles of shared values, co-created discourse, jointly promoted goals, resource sharing, and risk sharing. It is a community of shared values with a common understanding of interests, development vision, social culture, and operational order, and serves as an effective vehicle for deepening China's relations with countries along the "Belt and Road" [5].

Promoting the construction of the "Belt and Road" higher education community has a solid social foundation and policy platform, but it also faces many constraints and practical difficulties. In the future, promoting regional cooperation in higher education between China and countries along the route and building the "Belt and Road" higher education community should be based on mutual complementation, constructing a 'step-by-step' practical model for the higher education community, while also strengthening institutional development, first advancing the integration of Chinese higher education to provide preconditions for the community's construction; secondly, based on economic and social needs, enhancing the social participation of higher education, leveraging the strengths of higher education, creating a community culture with inclusive characteristics, and cultivating a shared cultural foundation in cooperation; in addition, it is necessary to enhance the systematicness and relevance of the community construction plan, and to improve the discourse power of the 'Belt and Road' higher education community [6].

4.2 The Practice of Construction on Higher Education Community

As a social organization based on regional higher education collaboration, there are many similar cooperative mechanisms internationally, such as the European Higher Education Area (EHEA), the Association of American Universities (AAU), the Group of Eight in Australia (Go8), the African Higher Education Research Space (AHERS), the Asian University Presidents Forum (AUPF), the Association of Southeast Asian Institutions of Higher Learning (ASAIHL), the Southeast Asian Ministers of Education

Organization (SEAMEO), the ASEAN University Network (AUN), and the China-ASEAN Education Exchange Week (CAECW). Domestically, there have also been many beneficial explorations and attempts in this regard.

In October 2015, Lanzhou University and other universities initiated the establishment of the "Belt and Road" University Alliance. 47 universities from 8 countries jointly issued the "DunHuang Consensus 2015", opening up the exploration of building a higher education community. Adhering to the concept of "interconnection, openness and inclusiveness, collaborative innovation, and win-win cooperation, "the alliance universities explore new mechanisms for transnational training and international talent training, and promote comprehensive exchanges and cooperation in education, science and technology, culture and other fields among universities in countries and regions along the "Belt and Road" [7].

In September 2025, at the 10th Anniversary Conference and Cooperation Forum of the "Belt and Road" University Alliance, the members of the Alliance have increased from the initial numbers to 197 universities covering 27 countries and regions around the world, forming a wide range of cooperation networks. After ten years of development, with higher education, vocational education, teacher education, digital education and student exchange, the forum released the "DunHuang Consensus 2025". The consensus proposes that the alliance will actively promote pragmatic cooperation in cutting-edge fields such as digital education, artificial intelligence empowerment, key science and technology research, high-level talent training and multi-civilization mutual learning, and work together to build a resilient and sustainable higher education community^[8].

4.3 The Example of Construction of Higher Education Communities

Taking China Three Gorges University(CTGU) into concerned, the concept of higher education community has been practiced through many aspects and actions. There are 26,584 full-time undergraduate students and 8778 doctoral and postgraduate students in the school and more than 1850 international students in CTGU before December 2025. CTGU has established cooperative relations with more than 170 universities in 60 countries and regions. CTGU has joined some International Education Organizations, shown as Fig. 2.

CTGU is one of members of Association of Universities of Asia and the Pacific (AUAP), which was officially established to promote academic collaboration across Asia and the Pacific founded on 28 July 1995 at Nakhon Ratchasima, Thailand, with the participation of more than 150 universities from 17 countries, after more than 17 years of preparation with support of UNESCO.

CTGU also joined the alliance as a member of N.E.W.S.(Global University Network) in 1998, and member of EPU(Eurasia Pacific Uninet) in 2000. Furthermore, CTGU was enrolled as one member of UNAI in 2014. The United Nations Academic Impact (UNAI) is a global initiative that aligns institutions of higher education with the United Nations in furthering the realization of the purposes and mandate of the Organization through activities and research in a shared culture of intellectual social

responsibility. For exchange students from most universities, the credits earned at CTGU can be transferred into those of the home universities^[9].

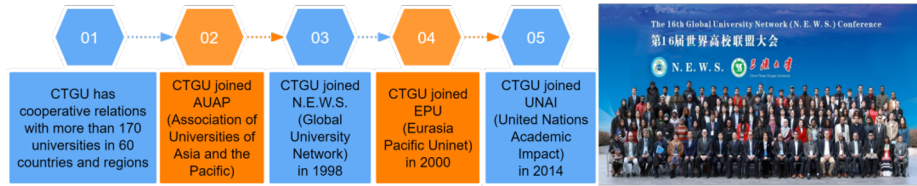


Fig. 2. CTGU became member of some International Education Organizations

The following Table. 1 gives a summary of the full-time teachers' overseas experience within International talent development details in CTGU.

Table 1. Overseas experience and international participation of full-time teachers. (Data statistics up to December 2025)

Type	Amount	Proportion
All full-time teachers	1614	100%
Foreign full-time teachers	18	1.1%
Overseas doctoral degree	49	3.0%
At least one year overseas study and work experience	236	14.6%
Serve in international organization (academic association)	5	0.3%
Positions in international academic journals	6	0.4%
Experience as president of major international conferences	13	0.8%

4.4 Strategies for Continuous Construction of Higher Education Community

Over the more than 10 years since the 'Belt and Road' Initiative was proposed, the Ministry of Education has thoroughly implemented the "Education Action for Promoting the Joint Construction of the Belt and Road," strengthened connectivity in the education field with countries involved in the initiative.

According to the "Survey Report on the Development of International Educational Exchanges under the Belt and Road" conducted nationwide across 2,000 universities, participation in the Belt and Road international alliances has become one of the important ways for universities to carry out international exchange and cooperation. Focusing on high-quality development, efforts should be made to explore strategies for deepening the construction of International higher education communities, starting from multiple aspects while continuing to refine and implement the governance of International university alliances^[10].

1) Strengthen top-level design and optimize the institutional engine for the construction of Higher Education Community

Under the background of "Belt and Road" initiative, the International higher education community must have rules and regulations so as to realize sustain healthy development. Member institutions will develop stable role expectations in the process of adapting to specific contexts and act upon them. When these role expectations are internalized into fixed normative value orientations among alliance members, institutional constraints within the alliance can be formed.

2) Building a Consensus Foundation and Strengthening the Level of Trust Among Members of Higher Education Community

The establishment of International higher education communities and educational alliances under the "Belt and Road", should focus on building consensus, clarifying goals, achieving deep integration, and jointly seeking development as key tasks, which creates a capacity for co-construction and shared benefits. In the future, International higher education alliances should emphasize cultural communication, shared values into conscious practical actions, enhance trust and understanding among members, and effectively reduce transaction costs within alliance institutions.

3) Maintaining Dynamic Stability and Improving the Communication Network of Governance in Higher Education Community

The establishment of any alliance is a complete process from admission to construction and then operation, among which alliance admission is the most critical. International university alliances should, firstly regularly update member institutions, and secondly continuously improve the member admission qualification selection mechanism, thereby promoting the dynamic stability and balance of the alliance. Whether the core values among alliance partners are aligned is key, and choosing the best partners is crucial for forming a strategic alliance.

5 Conclusion

To construct the International higher education community is conducive to establishing exchange platforms and mechanisms among universities, broadening the content and channels for higher education exchanges and cooperation in the countries jointly building the "Belt and Road," and fostering trust and integration among different cultures, forming a harmonious and inclusive cultural pattern. The higher education community within "Belt and Road", based on existing cooperation mechanisms and initiatives, promotes cooperation and complementary advantages in higher education among the countries along the route while recognizing current differences in higher education, which jointly cultivates higher education talents familiar with the political, economic, and cultural contexts of these countries, providing intellectual support for countries along the "Belt and Road."

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Disclosure of Interests

The authors have no competing interests to declare that are relevant to the content of this article.

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