

Curriculum Development of International Culture and Communication for Mining Engineering: An Exploratory Teaching Model Based on Experience Sharing

Tianyang Li¹, Nian Yu^{2,*}, Jinglei Wang³, Zhiwei Liao¹, Chaozhong Qin¹

¹*School of Resources and Safety Engineering, Chongqing University, Chongqing, China*

²*School of Electrical Engineering, Chongqing University, Chongqing, China*

³*Business College, Southwest University, Chongqing, China*

**Corresponding Author*

Abstract: In the post-pandemic era, global mobility has been significantly restricted, leading to a noticeable decline in students' enthusiasm for international exchange. However, due to the inherently global nature of resource development, mining engineering demands the cultivation of professionals with a worldwide vision and strong intercultural communication skills. It is essential to implement internationalized courses that, through innovative teaching models, stimulate students' interest in global opportunities and enhance their international awareness and engagement. Using the 'International Culture and Communication' course at Chongqing University as a case study, this paper proposes a teaching model based on global vision, intercultural competence, and academic motivation. Each session features instructors who have studied and lived abroad sharing personal experiences. This provides students with engaging insights into the personal and professional value of international exchange. The course broadens students' global perspectives, enhances intercultural communication skills, boosts learning motivation, and improves course satisfaction, providing theoretical and practical guidance for reforming internationalized engineering curricula.

Keywords: Mining Engineering; International Culture and Communication; Experience Sharing; International Talent Development

1. Introduction

In the context of globalization, mining engineering plays a vital role in ensuring national resource security and advancing

international capacity cooperation, placing higher demands on the international competence of talent in Southwest China [1]. As China's mining investments in Asia, Africa, and Latin America expand rapidly, cultural gaps, language barriers, and limited intercultural skills have become major obstacles to professionals participating in overseas projects. Chongqing University, a leading hub for mining engineering education in Southwest China, has strong expertise in intelligent mining and rock mass control. It has cultivated numerous professionals for national energy and resource development [2]. However, under the "New Engineering" initiative and global trends, the current curriculum does not fully align with the practical needs of Belt and Road countries. Students often struggle to adapt to the complex cultural environments of countries such as Indonesia, Zambia, and Peru, limiting their competitiveness in international careers and academic exchanges [3,4].

To address this, the program revised its training plan in 2022 and introduced a new foundational course, International Culture and Communication, in 2023. The course uses case-based teaching, project-driven learning, and international platforms to build intercultural competence, expand global vision, and boost students' motivation for overseas study. This meets the diverse demands of global mining cooperation [5,6].

As a required course, International Culture and Communication introduces global mining trends, foreign academic environments, and cultural differences to encourage students' participation in international academic exchange. However, the course content is still limited in scope, and traditional teaching models fail to meet students' expectations. Many students lack understanding

of foreign mining education, have unclear views on studying abroad, and show insufficient awareness of cultural diversity, leading to low motivation [7]. The absence of direct engagement with top global universities and experts further restricts students' global exposure [8].

To address these issues, the course invites instructors with overseas experience and mining experts from countries like Germany, Australia, Canada, and South Africa. They share insights on studying abroad, cultural differences, and international mining education. To address these issues, the course invites instructors with overseas experience and mining experts from countries like Germany, Australia, Canada, and South Africa. They share insights on studying abroad, cultural differences, and international mining education.

2. Problem Analysis

The traditional mining engineering curriculum presents several key issues:

2.1 Lack of International Perspective and Low Student Motivation

The earlier curriculum primarily focused on theoretical knowledge and international case studies within the mining industry, while offering limited exposure to foreign mining education systems and study-abroad experiences. Students lack understanding of curriculum structures, research directions, and academic environments at leading mining universities in countries such as Germany, Australia, Canada, and South Africa. This limits their ability to form specific goals and motivation in pursuing further studies abroad. Additionally, existing international culture and communication courses in the humanities have not fully explored the global value of mining engineering, such as its strategic role in energy transition and green mining development. This results in a weak sense of international relevance and low intrinsic motivation among students [9].

2.2 Insufficient Development of Intercultural Understanding

Mining engineering is a globally oriented discipline that requires strong intercultural communication skills. However, the current curriculum provides only superficial cultural content, lacking in-depth discussion of overseas study life, cultural adaptation, and intercultural

communication strategies. As a result, students struggle to understand and address potential cultural conflicts abroad, hindering their intercultural competence [10,11].

2.3 Monotonous Teaching Methods and Limited Practical Engagement

Current teaching remains lecture-based and traditional, offering few opportunities for interaction with international experts. Practical components rely mainly on case analysis and in-class discussion, with limited exposure to real-world scenarios or international academic resources. Students have little direct contact with global mining professionals or university environments, which restricts the development of innovative thinking and international awareness.

2.4 Post-Pandemic Limitations on International Engagement

Global mobility remains constrained in the post-COVID era, reducing opportunities for international collaboration and academic exchange. Meanwhile, student interest in studying abroad has significantly declined. A university survey in 2023 showed that only 5% of mining engineering students expressed a clear intention to study overseas, nearly a 100% drop compared to pre-pandemic levels. These factors have further weakened students' global perspective and intercultural communication abilities [12,13].

3. Teaching Reform Strategy

To address the challenges outlined above, the mining engineering program at Chongqing University has introduced a new foundational course, International Culture and Communication. The course aims to broaden students' global perspectives and enhance intercultural competence. It introduces global mining industry trends, intercultural communication skills, and international academic resources. This study proposes a teaching reform strategy based on a three-dimensional training framework: global vision, intercultural competence, and academic motivation. By incorporating innovative teaching models, optimizing course content, and integrating digital tools, the reform aims to enhance the quality of instruction and inspire students to pursue further studies abroad.

3.1 Distinctive Teaching Model: Inviting Instructors with Overseas Study Experience and International Experts

The core feature of this course reform is a teaching team that includes instructors with overseas study experience and mining engineering experts from countries such as Germany, Australia, Canada, and South Africa. The teaching team includes faculty members who have studied or worked at renowned institutions, such as Utrecht University, Nanyang Technological University, the University of Alberta, and the University of British Columbia. These instructors share personal experiences of studying and living abroad. They provide real-life examples of academic research, cultural adaptation, and career development. Additionally, international experts in mining engineering, such as specialists in intelligent mining technologies from the University of Queensland and mine safety scholars from the University of Alberta, deliver lectures and seminars. These sessions focus on cutting-edge international technologies and academic environments to inspire students' interest and enthusiasm for global learning.

3.1.1 Course content design

The course content is organized into three main modules designed to foster students' enthusiasm for studying abroad.

(1) The first module focuses on sharing study abroad experiences. Instructors and experts discuss their time in countries like Germany, Australia, Canada, and South Africa, covering learning environments, lifestyles, social interactions, and cultural adaptation strategies. For example, the rigorous academic atmosphere in German universities, the open teaching model in Australia, and the multicultural campus environment in Canada are introduced. Real-life examples help students understand studying abroad practically, easing concerns about unfamiliar environments and boosting interest in overseas studies.

(2) The second module compares cultural differences between China and other countries. It focuses on professional culture and academic exchange characteristics in the mining engineering field. For instance, German engineering education emphasizes integrating theory and practice; Australia focuses on industry-academia collaboration; Canada prioritizes environmental protection and sustainability; and South Africa emphasizes

mining safety and community relations. This module cultivates students' intercultural communication skills. It helps them understand potential cultural challenges in international academic and professional environments and develop effective adaptation strategies.

(3) The third module introduces mining engineering programs at prestigious universities. These include Freiberg University of Mining and Technology, the University of Western Australia, the University of Queensland, the University of British Columbia, the University of Alberta, and the University of Pretoria. The module covers program features, course structures, research directions, laboratory facilities, and international collaboration projects. By showcasing the academic resources and strengths of these leading institutions, the module motivates students to pursue further studies abroad and define their academic goals.

3.1.2 Implementation methods

(1) Each semester, four to six instructors with overseas study experience and one to two outstanding international students will deliver specialized lectures covering the three modules outlined above. The lectures will adopt an interactive teaching format, encouraging students to ask questions and engage in discussions.

(2) Case-based teaching will use study abroad case studies and intercultural communication scenarios to organize group discussions and role-playing exercises, enhancing students' cross-cultural understanding and problem-solving abilities.

(3) An online communication platform, using digital tools, will connect students with professors or international students from overseas universities. This platform will facilitate video calls where academic and life experiences can be shared, further promoting intercultural exchange.

3.2 Integrating Ideological Education into the Curriculum to Enhance Professional Identity

To strengthen students' sense of identity with the mining engineering profession, the course incorporates ideological and political education elements. It highlights the critical role of mining engineering in global energy transitions, the Belt and Road Initiative, and the "carbon neutrality" strategy. For example, by showcasing successful cases of Chinese mining companies operating in Belt and Road countries, the course

demonstrates the international value of mining engineering. Additionally, sharing success stories of Chinese students studying abroad inspires pride in students' profession and motivates them to excel in their studies.

3.3 Applying Digital Tools to Optimize Teaching Resources

To enhance the relevance and accessibility of course resources, the International Culture and Communication course in mining engineering will incorporate a range of digital tools. A knowledge map will be developed for the course to outline global mining industry trends, intercultural communication knowledge, and the characteristics of international mining programs. This will form a visual knowledge network. Artificial intelligence tools will conduct multimodal analysis of course content to create a resource repository. This repository will include a concept library, a case study library, and a video library, providing personalized learning support for students. Furthermore, platforms such as Yuketang will be used to collect real-time student learning data, conduct quizzes, and provide feedback analysis. This dynamic approach will enable adjustments to teaching strategies, ensuring alignment between course content and student needs.

4. Conclusion and Outlook

This study analyzes the mining engineering curriculum at Chongqing University, highlighting its deficiencies in fostering international perspectives, intercultural competence, and academic motivation. The findings show that students lack a comprehensive understanding of foreign mining education systems and study-abroad life, leading to weak professional identity and low motivation for further studies abroad. The course content and traditional teaching methods limit the development of intercultural communication skills. Outdated resources and insufficient practical components also restrict students' international thinking and innovation. In response, the mining engineering program introduced the International Culture and Communication course in 2023, based on a reform strategy of global vision, intercultural competence, and academic motivation. This reform includes inviting instructors with overseas experience, integrating ideological education, optimizing practical teaching, and

applying digital tools. These changes have significantly improved course quality. These changes have sparked students' enthusiasm for studying abroad, enhanced their intercultural skills, and deepened their understanding of global mining trends, supporting the cultivation of globally competitive, interdisciplinary talent.

Acknowledgments

This paper is jointly supported by the key Project of Chongqing Education Science Planning (No: K24YD2010029), Chongqing Higher Education Teaching Reform Research Project (No. 243032), Chongqing University Graduate Education Reform Project (No. CQU230211), and Chongqing First-Class Undergraduate Course "Physical Geology" (No. 2023-2-001).

References

- [1] Donetskaya S S, Zhan Y. Internationalization of Higher Education in China: Modern Trends. *Высшее образование в России*, 2019(6): 63-74.
- [2] Liu L, Li Y, Ming C, et al. Challenges and Opportunities of Higher Education for International Mining Engineers in China: Based on the Practice at Chongqing University. *International Journal of Georesources and Environment - IJGE (formerly Int'l J of Geohazards and Environment)*, 2018, 4(3): 49-53.
- [3] Solovyeva A, Galankina I, Lukyanchenko M, et al. Problems of Teaching Professional Communication to Chinese Hydrotechnical Engineering Students]. *European Proceedings of Social and Behavioural Sciences*, 2021, Man, Society, Communication.
- [4] Xie Q. Analyzing Professional English Learning Needs and Situations of Science and Language Majors in a Chinese University. *Higher Education Studies*, 2019, 9(2): 141-153.
- [5] Li Q, Han Y, Li Z, et al. The influence of cultural exchange on international trade: an empirical test of Confucius Institutes based on China and the 'Belt and Road' areas. *Economic research-Ekonomska istraživanja*, 2021, 34(1): 1033-1059.
- [6] Yang C, Dealwis C, Noyan J F. "Belt & Road" international education and cultural exchange in higher education in Malaysia among mainland Chinese students.

- International Journal of Service Management and Sustainability, 2023, 8(2): 209-228.
- [7] Kazanin O I, Drebenstedt C. Mining Education in the 21st Century: GLOBAL Challenges and Prospects. Записки Горного института, 2017, 225 (англ.): 369-375.
- [8] Liu X, Liang L L, Liu E. Science Education Research in China: Challenges and Promises. International Journal of Science Education, 2012, 34(13): 1961-1970.
- [9] Wagner H. How to Address the Crisis of Mining Engineering Education in the Western World? Mineral Resources Engineering, 1999, 08(04): 471-481.
- [10] Yue Z, Zhao K, Meng Y, et al. Toward a better understanding of language learning motivation in a study abroad context: an investigation among Chinese English as a foreign language learners. Frontiers in psychology, 2022, 13: 855592.
- [11] Xie X. Transnational higher education partnerships in China: exploring the impact of Chinese students' intercultural communicative competence on their motivation to study abroad. Educational Research and Evaluation, 2022, 27(3-4): 280-308.
- [12] Xiao Z. The post-COVID-19 pandemic study abroad intentions of Chinese undergraduate students: a case study of Shenzhen. Lingnan Theses (Doctoral degree), 2024.
- [13] Li X, Dai K, Zhang X. Transnational Higher Education in China: Policies, Practices, and Development in a (Post-)Pandemic Era. Higher Education Policy, 2024, 37(4): 761-778.