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A Study on the Cultivation of International Engineering Translation Practitioners under the Background of the Belt and Road Initiative

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Abstract: Under the development of the Belt and Road Initiative, China's participation in the international engineering field has been increasing continuously, making an urgent demand for high-quality international engineering translation practitioners with compound capabilities, and also becoming one of the trends in the cultivation of English major students in universities in China. This study firstly reviews the relevant literature included in China National Knowledge Infrastructure (CNKI), examines the development and current status of engineering translation research in China, and focuses on the characteristics of international engineering translation, the demand for translation practitioners, and the limitations of the current training models. Based on this, a core competency model was developed, covering four dimensions: translation professional competence, engineering professional knowledge competence, intercultural communication competence, and comprehensive professional competence. This paper then accordingly proposes the cultivation pathway for international engineering translation practitioners, thereby providing theoretical references and practical guidance for the reform of translation practitioner education for English majors in universities in China and training programs for translators in the enterprise.

Keywords: Belt and Road Initiative; International engineering translation; Core Competency Model; Intercultural communication

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1. Introduction

The Belt and Road Initiative, as an important strategy for China to integrate into the global economic system and promote the building of a community with a shared future for mankind, has effectively accelerated the pace of Chinese engineering construction enterprises going global. Connecting infrastructures is a priority part of the initiative, resulting in a rapid development of international projects, such as the construction of railways,

highways, and ports all over the world. In the entire process of these projects, from bidding, negotiation, signing, to construction, operation, and maintenance, precise and efficient language communication together with information transition are all essential prerequisites for the smooth progress of the projects. International engineering translation, as a "bridge" connecting multiple stakeholders, including owners, contractors, supervisors, subcontractors, and local governments, has gone beyond the traditional sense of language transformation. It directly relates to the accurate transmission of technical standards, the strict enforcement of contract terms, and the proper handling of cultural conflicts. And in turn, it affects the overall success or failure of the project and the maintenance of the corporate reputation.

However, in the face of the vigorous development of the Belt and Road Initiative, the supply of high-level international engineering translation practitioners in China is difficult to meet the demand [1]. The research focused on 50 foreign-related engineering enterprises revealed that existing translators generally have problems such as "weak professional knowledge", "insufficient intercultural communication skills", and "poor overall quality" [2]. Thus, the traditional training model centered on language skills can no longer meet the compound requirements of international engineering projects for translation practitioners to understand engineering, be proficient in management, be good at communication, and be able to withstand pressure. In this context, how to systematically define the core competencies that international engineering translation practitioners should possess and how to build a scientific and efficient training system has become a common concern in the research fields of translation, education, and engineering. Although a preliminary discussion on core competencies and the improvement pathways has been proposed, the research is based on experience summary and has not yet formed a systematic theoretical model, and the training pathways proposed also need to be further improved [3].

To this end, this study attempts to construct a comprehensive core competency model for international engineering translation practitioners by systematically reviewing the relevant research in China over the past decade, and proposes a set of multi-level and operational training pathways around this model, thereby providing theoretical support and practical reference for solving the talent bottleneck problem and serving the national strategy.

2. Literature review

Research on engineering translation in China has gone through a process from start-up, rise to rapid development, along with the advancement of the "going global" strategy and the "Belt and Road Initiative."

2.1. Research on the role evolution and the importance of international engineering translation

Early research recognized the crucial role of translation in international engineering. Some scholars positioned translation as "tool", "bridge", and "guarantee", and emphasized its irreplaceability throughout the entire process of engineering contracting and labor cooperation [4]. Some further pointed out that communication is the primary problem in the process of overseas construction, and engineering translation is the core means to solve this problem [5]. With the increasing complexity, some experts extended their research perspective to the translation management level, who analyzed the organizational model and existing problems of translation management in international engineering projects [6]. This research reflects that the role of translation has shifted from individual behavior to systematic and organized resource management.

2.2. Research on language features and translation strategies of international engineering texts

This is the most concentrated area of international engineering translation research at present, with research mainly focusing on core texts such as contracts and tenders.

Language features: Scholars generally believe that international engineering texts (especially contract texts) are characterized by professionalism, rigor, and complexity. Scholars analyzed the characteristics of international engineering texts in terms of lexicon (such as technical terms, antiform words, synonyms, and parallelism) and syntax (such as long and complex sentences, passive voice, and conditional sentences) [7–8]. A translator in the practice report dissected in detail the characteristics of international engineering contracts at the lexical, syntactic, and textual levels, such as nominalized verbs, a large number of elliptical sentences, and explanations within parentheses [9].

Translation theories and techniques: Researchers attempted to use a variety of translation theories to guide practical work. The functional equivalence theory proposed by Nida is widely applied in the field of contract translation, which emphasizes the priority equivalence of content and effect in the translation process [9–10]. The skopos theory proposed by Vermeer is used to guide the translation of tender documents and prequalification documents with a clear purpose [11–12]. Ecological translation studies provide a macroscopic perspective on adaptive selection from the dimensions of language, culture, and communication for international engineering translation [13]. At the level of translation techniques, related research involves aspects such as word choice, part-of-speech conversion, addition and subtraction of translation, long sentence splitting, and recombination [14–15].

On-site interpretation strategies: In terms of on-site interpretation strategies, unlike in written translation, an interpreter, based on his own on-site practical experience, summarized seven flexible interpretation strategies, such as identifying unconventional usages, grasping communication intentions, the interpretation method, the drawing method, etc. [16]. These strategies highlight the immediacy and flexibility of on-site translation.

2.3. Research on the training and current situation of international engineering translation practitioners

The questionnaire survey provides valuable empirical data, which reveals the comprehensive requirements of enterprises for translators in terms of bilingual ability, professional knowledge, communication and coordination skills, etc., and also points out the disconnection between university training and market demand [2]. Some scholars put forward the four core competencies of international engineering translators: translation professional competence, comprehensive vocational competence, intercultural communication ability, and teamwork ability, which is an important summary of the competency structure of international engineering translators [3]. Several studies have put forward suggestions for translator cultivation from different perspectives, such as the approaches to the cultivation and management of international engineering translation practitioners from the perspectives of the demand for personnel in enterprises and personal career development, a new translator cultivation pathway of "1+1+1+1", and the use of CAT (Computer-Aided Translation) technology and the establishment of practice bases to enhance the practical teaching of international engineering translation practitioners [17–19].

2.4. Overview

A review of the existing literature reveals that the study fully demonstrates the importance of international engineering translation; The language features and translation methods of the core text have been explored in depth; A preliminary consensus was formed on the basic capabilities that international engineering translators

should possess; And it began to focus on reforming the talent development model. However, literacy research lacks a systematic model and fails to construct a theoretical model that is clear in hierarchy, distinct in dimensions, and complete in elements; The training pathway lacks systematization and fails to form a closed-loop system from training objectives, curriculum design, teaching implementation, practical training to evaluation feedback; The depth of interdisciplinary integration is insufficient, mostly remaining at the level of "translation + engineering terminology", and there is a lack of effective solutions on how to deeply integrate knowledge from disciplines such as project management, intercultural management, and international commercial law into the entire process of translation talent cultivation.

3. Research methods

This study used China National Knowledge Infrastructure (CNKI) as the primary source database and employed the systematic literature review method. The search keywords included the combined use of "international engineering translation", "engineering translation", "engineering English", "translation talent", "core literacy", "cultivation pathway", "Belt and Road Initiative", etc. The focus is on literature from 2013 to 2024, which covers the peak period of research after the Belt and Road Initiative was proposed, as well as some pioneering early literature. The types of literature included journal articles, dissertations, conference papers, and review articles. Through screening and sorting of the search results, 26 core papers highly relevant to the subject were finally identified as the objects of analysis. Carefully read the selected literature to extract discussions, data, and viewpoints related to "international engineering translation talent competence", "quality requirements", "training models", "existing problems", etc.

The content analysis was employed to summarize, categorize, and code the extracted content to identify recurring key competency elements and training suggestions. Based on the content analysis, the identified competency elements are integrated, clustered, and elevated by drawing on the theoretical framework of the competency model. First, the scattered competency points were categorized to form an initial competency dimension; secondly, the logical relationships among the dimensions were analyzed to ensure the integrity and synergy of the model; finally, the specific content and constituent elements of each dimension were defined to form the final core literacy model. With the constructed core competency model as the "target state", and the current status and problems of translator cultivation as the "present state", through analysis, the key measures were deduced to achieve the leap from the "current status" to the "target." These measures cover the key links of translator cultivation, such as curriculum, teaching, practice, and evaluation, and together they constitute a systematic cultivation pathway.

4. Research results

Based on a systematic analysis of the literature, this study presents a model of core competencies for international engineering translators that includes four core dimensions with twelve key elements. The model is an organic whole, with the four dimensions supporting and interpenetrating each other, jointly defining the competency characteristics of outstanding international engineering translators in the new era.

4.1. Dimension 1: Translation professional competence

This is the basic competence of translation practitioners, but it is endowed with higher and more professional

requirements in the context of international engineering.

Bilingual translation skills: Not only are precise English-Chinese translation skills required, but also a foundation in a minor language or the ability to collaborate with minor language translators as the Belt and Road Initiative extends into non-English speaking areas [20]. The translation is required to be "precise in wording and fluent in language" in the contract text, uniform in terminology in technical documents, and quick in response and fluent in expression in on-site interpretation [9].

Engineering text stylistic ability: Translators are required to deeply understand and skillfully handle the stylistic features, stylistic expressions, and discourse structures of different types of engineering texts (contracts, tenders, technical specifications, drawing descriptions, meeting minutes, etc.) [7, 21]. The ability to select appropriate translation strategies and language styles based on the requirements of different types of texts is the essential competency needed.

Technical tool application ability: Translators should be proficient in using CAT tools, terminology management systems, corpus tools, etc., to improve translation efficiency and consistency [19]. At the same time, basic office and project management software should be mastered to adapt to modern, team-based translation project management [6].

4.2. Dimension 2: Engineering professional competence

Engineering professional competence is the fundamental characteristic that distinguishes international engineering translators from general translators, and it is also a prerequisite for accurately understanding the source text and generating qualified translations.

Core engineering domain knowledge: It is suggested to have a systematic understanding of the basic knowledge, fundamental principles, and process flow of at least one major engineering field (such as civil, electrical, hydraulic, mechanical, etc.) [8, 15]. International engineering translators should be able to read simple drawings and technical solutions.

Engineering management knowledge: It is suggested to understand the full life cycle management of international engineering projects, and be familiar with international common engineering management models, processes, and key nodes such as FIDIC contract conditions [11]. This helps the translator to accurately grasp the information in context and anticipate potential risks.

Knowledge of relevant regulations and standards: Familiarity with international commercial laws related to engineering, industry technical standards, and norms (such as ISO, ASTM, etc.) is highly recommended, as well as relevant laws and regulations in the country where the project is located [22]. This is the key to ensuring that the translation of contract terms is legal and compliant.

4.3. Dimension 3: Intercultural communication literacy

In the multicultural context of the Belt and Road Initiative, intercultural communication competency is the soft power to ensure that international engineering translators can communicate effectively and resolve cultural conflicts.

Cultural sensitivity and adaptability: It is highly recommended to have a deep understanding and respect for the history, religion, social customs, values, and behavioral patterns of the country where the project is located [3]. Translators should be able to quickly adapt to a foreign cultural environment and overcome culture shock.

Intercultural communication and negotiation skills: Translators should be able to identify and deal with

cultural barriers in communication, and be good at using various strategies (such as interpretation, drawing, identification, etc.) to ensure that information is correctly understood [16]. In negotiations and dispute resolution, they can act as cultural "lubricants" and "interpreters."

Global vision and local consciousness: International engineering translation practitioners should have the world in mind, but act locally. While adhering to principles, being flexible, and seeking solutions that are acceptable to all parties will promote the localization integration of the project.

4.4. Dimension 4: Comprehensive professional competence

Comprehensive professional competence is the non-intellectual factor that supports international engineering translators in continuously and stably delivering value in the complex and high-pressure international engineering environment.

Professional ethics and responsibility: Translators should adhere strictly to confidentiality agreements, remain neutral and impartial, and be highly responsible for the quality of translation. They should bear in mind that "the special role of translation work is irreplaceable", every word and sentence may be related to significant economic interests and corporate reputation [4, 22].

Teamwork and communication coordination skills: International engineering projects are often large-scale, and translators need to closely collaborate with project managers, engineers, lawyers, financial personnel, etc. [3]. Excellent communication and coordination skills are the foundation of being a member of an efficient team.

Stress and adaptability: The international engineering site environment is complex, the schedule is tight, and there are many unexpected situations. Translators need to have a strong psychological resilience, be able to remain calm under pressure, and respond flexibly to various unexpected verbal and non-verbal events [23].

On the basis of the core competency model, this study proposes a systematic training pathway, builds a modular curriculum system of "language—engineering—management—culture" integration, promotes an immersive teaching model driven by "case—simulation—project", builds an open practice platform of "school-enterprise—school-local—international" collaboration, and implements a dynamic assessment mechanism oriented by "process—ability—diversity." The aim is to break down the barriers between universities, enterprises, and students and achieve supply-side reform of talent cultivation.

5. Conclusions

Based on a systematic review of literature on international engineering translation in the context of the Belt and Road Initiative, this study constructs a core competency model consisting of four dimensions: translation professional competency, engineering professional knowledge competency, intercultural communication competency, and professional comprehensive competency. Then, a systematic training pathway integrating curriculum system, teaching mode, practical platform, and assessment mechanism was proposed.

The theoretical value of this study lies in that it integrates and elevates previous fragmented and empirical descriptions of translator capabilities into a clear and rich theoretical model, thereby providing a theoretical framework for talent evaluation and standard setting in the particular field of international engineering translation. The practical significance of this study lies in the fact that the proposed training pathway provides a concrete and operational solution for universities to solve the problem of cultivating compound translation practitioners, and also provides a reference basis for enterprises to conduct on-the-job training and ability assessment of translators.

However, there are certain limitations to this study. First, the construction of the core competency model is mainly based on literature analysis, and its validity and reliability await further verification and correction by subsequent empirical research. Secondly, the proposed cultivation pathway is more of a theoretical design, and its actual effect needs to be tested, adjusted, and optimized in specific teaching practices and cooperative projects. Thus, further research can focus on the empirical research employing the proposed model and training pathway for improvement and optimization.

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