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Research on the Practical Application of Ecological Translation Teaching in the Intelligent Era

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Abstract: The advent of the intelligent era has driven profound changes in the field of translation. With the in-depth application of intelligent technologies such as machine translation and neural machine translation in the translation industry, the traditional translation teaching model can hardly meet the requirements of the new "human-machine collaboration" work paradigm. Based on the theory of ecological translation studies, this paper constructs an "intelligent ecological translation teaching model featuring human-machine collaboration". The study proposes to take "translator-led, technology-empowered" as the core concept, and realize the organic integration of translation competence and technical literacy by reconstructing teaching objectives, innovating teaching processes, and optimizing evaluation systems. This model provides a theoretical framework and practical path for the reform of translation teaching in the intelligent context, and has important guiding significance for cultivating new-type translation talents who can adapt to the development of the industry.

1. Introduction

Currently, the accelerated advancement of globalization and digitalization has led to an explosive growth in the demand for cross-linguistic communication. From the localization of business documents in multinational corporations, to the translation of technical documents in the field of science and technology, and to the cross-cultural communication in the cultural and creative industries, the complexity and diversity of translation work have reached an unprecedented level. At the same time, the rapid iteration of intelligent translation technology is redefining the value chain of translation work [1,2]. The traditional manual-dominated translation model is shifting towards a new working model of "Machine Translation + Post-Editing (MTPE)". This transformation requires translators to not only possess solid linguistic proficiency and cross-cultural competence, but also master new skills for collaborating with intelligent tools.

The theory of Ecological Translation Studies provides us with an important theoretical perspective. This theory emphasizes that translation is a dynamic process in which translators adapt to the translation ecological environment and make choices [3]. This viewpoint helps us understand how intelligent technology reconstructs the translation ecological environment and how translators

maintain their subjectivity in the new environment. Based on this theory, we propose the "Intelligent Ecological Translation Teaching Model with Human-Machine Collaboration". The core of this model lies in repositioning the relationship between translators and intelligent technology, and emphasizing the new collaborative relationship of "translator-led and technology-empowered".

2. Analysis of the Constituent Elements of the Translation Ecological Environment in the Intelligent Era

With the in-depth application of artificial intelligence technology in the field of translation, the constituent elements of the translation ecological environment have undergone significant changes [4]. The three elements of language, culture, and communication in traditional translation theories have presented new connotations and characteristics in the intelligent era, and these changes have profoundly affected the nature of translation practice and the working methods of translators.

2.1 Expansion and Reconstruction of the New "Language" Element

In the translation ecological environment of the intelligent era, the scope of the language element has been greatly expanded. The original output of machine translation has become a new "language" element that cannot be ignored in the translation process. Different from traditional source texts, machine translation output has its unique linguistic characteristics: it tends to be standardized in grammatical structure and shows a certain degree of predictability in vocabulary selection, but has obvious limitations in terms of linguistic creativity and cultural specificity. Translators need to possess the ability to analyze and evaluate the quality of machine translation, and be able to quickly identify potential mistranslations, omissions, or culturally inappropriate expressions in it [5].

More importantly, these digital linguistic resources are changing the relationship between translators and texts. Translators are no longer merely converters from source texts to target texts, but have become integrators and optimizers of various text resources. They need to simultaneously process multiple information streams such as source texts, machine translation suggestions, terminology database prompts, and translation memory matches, and make optimal choices based on this information. This working method requires translators to have stronger information processing capabilities and text critical thinking abilities.

2.2 Complexity and Deepening of the New "Culture" Element

Intelligent technology has added new complexity to the cultural dimension of translation. The cultural bias inherent in algorithms is a new cultural element worthy of attention. The training data for machine learning models often comes from specific cultural contexts, which may lead to systematic biases when the models process certain culture-specific content. For instance, when handling texts involving sensitive topics such as gender, race, and religion, algorithms may unconsciously reinforce certain stereotypes. Translators need to have the ability to identify and correct such algorithmic biases to ensure that translation results comply with the principle of cultural fairness. "Prompt engineering" in human-machine interaction has also formed a new cultural phenomenon. Effective communication with artificial intelligence systems requires mastering specific skills and strategies, which is similar to learning a new way of cross-cultural communication. Translators need to understand the "cultural characteristics" of different AI systems—i.e., their preferences and patterns in information processing—to obtain ideal output results through precise instructions. This ability to "culturally adapt" to machines is becoming an important competency for modern translators [6].

The localization demand for global digital content has also put forward higher requirements for cultural adaptation. With the explosive growth of digital content, simple language conversion can no longer meet market needs. Translators need to deeply understand the subtleties of the target culture, including the symbolic meaning of visual elements, the psychological associations of colors, and the habitual preferences in interactive design. This in-depth cultural adaptation requires translators to possess cross-cultural design thinking and user experience awareness.

2.3 Multidimensionalization and Professionalization of the New "Communication" Element

In the intelligent era, the communication element in translation exhibits distinct multidimensional characteristics. The network of communicative relationships that translators need to handle has become more complex, including communicating with clients about their needs, collaborating with technical tools, and coordinating with other professionals in teams. This multidimensional communication environment requires translators to possess stronger project management and coordination capabilities.

Communication with technical tools has become a new and important dimension. Translators need to understand the working logic of different translation tools and master methods for effective interaction with them. This includes being able to accurately evaluate the performance characteristics of tools, select appropriate tool combinations based on specific tasks, and provide timely feedback and make adjustments during use. This human-machine collaboration capability directly affects translation efficiency and quality.

It is particularly important to emphasize that these new elements do not exist in isolation, but rather form an interconnected and dynamically changing ecosystem. The way language elements are handled affects the effectiveness of cultural adaptation, and the choice of communication strategies restricts the efficiency of language resource utilization. Another notable feature brought about by the evolution of the translation ecological environment in the intelligent era is the accelerated update speed of various elements. New tools, new resources, and new working methods emerge constantly, requiring translators to maintain a mindset and ability for continuous learning. The translation ecological environment is no longer a relatively stable background, but a dynamic field that requires constant adaptation and exploration. This dynamism means that translation education must place greater emphasis on cultivating students' learning ability and adaptability, rather than merely imparting specific knowledge and skills.

3. Core Challenges Facing Current Translation Teaching

With the rapid development and widespread application of artificial intelligence technology in the field of translation, the gap between the traditional translation teaching system and the actual needs of the industry is increasingly widening. This gap is not only reflected in the use of technical tools, but more profoundly in multiple core links such as teaching philosophy, content, methods, and evaluation. Current translation teaching mainly faces the following challenges, which are interrelated and jointly restrict the improvement of talent cultivation quality.

3.1 Imbalance in Teaching Objectives

The primary challenge faced by modern translation teaching lies in the imbalanced positioning of teaching objectives. In traditional translation teaching, the cultivation objective is relatively singular, focusing mainly on students' language conversion ability and cross-cultural understanding ability. However, as intelligent technology is deeply integrated into the translation process today, this singular objective is far from meeting actual needs. When responding to technological changes,

many translation teaching institutions often adopt a simple "superposition" approach—adding some computer-aided translation tools or machine translation-related courses to the original curriculum system. This teaching model, where "technology" and "translation" are separated like "two pieces of skin", makes it difficult for students to organically integrate the use of technical tools with the cultivation of translation competence.

More worrying is that this fragmented teaching objective may lead students to fall into two extremes. On the one hand, some students may over-rely on technical tools, gradually losing the ability to think independently and conduct critical analysis, and thus become mere "editing machines". They are accustomed to accepting the initial results of machine translation and only perform superficial text polishing, lacking in-depth thinking about the deep meaning of the text, cultural connotations, and communicative purposes. On the other hand, some students may hold a resistant attitude towards new technologies, sticking to traditional manual translation methods and struggling to adapt to the work rhythm and requirements of the modern translation industry. This phenomenon of polarization reflects the ambiguity and wavering in the objective positioning of current translation teaching, which has failed to establish a clear goal of cultivating "technology-empowered translation talents".

3.2 Outdated Teaching Content

The second prominent challenge facing translation teaching is that the update speed of teaching content lags far behind the pace of technological development and industry transformation. Most translation textbooks and course content are still based on past translation practices, seriously lacking reflection of the latest developments in the current industry. The deficiency of teaching content is particularly obvious in the following key areas:

First, the content related to the critical use of artificial intelligence tools is seriously insufficient. Existing teaching often stays at the superficial introduction of tool operations, lacking guidance for students to deeply understand the working principles, limitations of machine translation, and its applicability in different text types. What students need to master is not only how to use these tools, but more importantly, how to evaluate the quality of their output, identify potential errors and biases, and make correct revision decisions based on this.

Second, there is a lack of knowledge about project management. Modern translation work is increasingly carried out in the form of projects, involving multiple links such as team collaboration, progress control, quality management, and client communication. However, existing translation courses rarely cover these contents systematically, resulting in graduates having to spend a lot of time re-learning the basic knowledge and skills of project management.

In addition, the teaching content on human-machine collaboration strategies is almost non-existent. In actual work environments, translators need to flexibly select appropriate combinations of technical tools and formulate efficient work processes according to the characteristics of specific tasks. The cultivation of this strategic thinking ability barely finds a proper place in the current teaching system.

3.3 Disconnection in Teaching Practice

The third challenge facing translation teaching manifests as a severe disconnection between the teaching practice segment and real-world work scenarios. Traditional translation classroom exercises often set overly idealized conditions: students work with simplified texts, face no time pressure, and lack the support of real work environments and tools. This "greenhouse-style" training method fails to adequately prepare students for the complex situations they will encounter in the actual workplace.

In real translation work, translators need to handle complex texts filled with uncertainties. They often have to complete translation tasks collaboratively with team members under tight time constraints and with the assistance of various technical tools. They must respond to frequent changes in client requirements, address ambiguous expressions in technical documents, and resolve subtle issues in cross-cultural communication. These real work scenarios and challenges are hardly fully simulated or reflected in current translation classrooms.

Furthermore, existing practical teaching also lacks comprehensive training on technology-enhanced translation workflows. Students rarely have the opportunity to experience the complete workflow from project initiation, preprocessing, translation, and proofreading to delivery—let alone flexibly use various technical tools throughout this process. This disconnection means that even if graduates master the operation skills of certain tools, they struggle to apply them effectively in practical work.

These four major challenges form an interconnected whole, reflecting the profound contradiction between the traditional translation teaching system and translation practice in the intelligent era. Addressing these challenges requires educators to carry out systematic innovations from philosophy to practice: rethinking the positioning, content, methods, and evaluation of translation talent cultivation, and establishing a new teaching model that adapts to the translation ecological environment of the intelligent era. This not only relates to the future development of translation education but also affects whether the entire translation industry can successfully achieve digital transformation and upgrading.

4. Construction of the Intelligent Ecological Translation Teaching Model with Human-Machine Collaboration

4.1 Transformation of the Core Concept of the Model

The core concept of the intelligent ecological translation teaching model has achieved a profound shift from the traditional "translator-centered" approach to the "translator-led human-machine collaboration" approach. This concept emphasizes that in a translation environment deeply intervened by intelligent technology, translators remain the ultimate decision-makers and responsible subjects of translation activities, while intelligent tools serve as important auxiliary means to enhance translators' capabilities.

The subjectivity of translators is not weakened by the intervention of technology; instead, it is strengthened and extended to a higher level. Intelligent tools provide translators with more powerful information processing capabilities, richer resource support, and more efficient workflows, enabling translators to devote more energy to core tasks that require creative thinking and cultural insight.

Guided by this concept, translators need to develop a new competency structure. First is the ability for critical understanding of technical tools, which allows them to accurately evaluate the applicable scenarios and limitations of different tools. Second is the decision-making ability supported by technology, which enables them to make optimal choices in a human-machine collaboration environment. Finally is the innovative ability in technology application, which allows them to creatively use technical tools according to the needs of specific tasks. These competencies collectively ensure that translators maintain a leading position in the new environment and achieve the organic integration of technology and translation capabilities.

4.2 Overall Structure of the Teaching Model

The intelligent ecological translation teaching model constructs a closed-loop teaching system driven by real translation projects. This system consists of three interconnected phases, forming a

spiral-up learning cycle.

In the pre-class intelligent preview phase, students receive project tasks via an online platform, use intelligent tools for background knowledge learning and terminology preparation, and initially establish a project cognitive framework. This phase emphasizes the cultivation of students' independent inquiry abilities, while teachers provide necessary guidance and support through the online platform.

The in-class human-machine collaborative exploration phase is the core link of the teaching model. During this phase, students conduct project practice in groups and carry out human-machine collaborative translation under the guidance of teachers. The teaching focus shifts from mere language conversion to comprehensive problem-solving: students need to use various technical tools to complete translation tasks and continuously optimize workflows in practice. Teachers play the role of guides and facilitators in this process, helping students improve the efficiency and quality of human-machine collaboration through individualized guidance, group discussions, and collective commentaries.

The post-class iterative reflection phase focuses on knowledge internalization and ability transfer. By writing project reports, conducting result presentations, and participating in online discussions, students systematically summarize the experiences and lessons learned during the project implementation. Teachers organize thematic seminars to guide students in in-depth analysis of key issues in human-machine collaboration, elevating scattered practical experiences into a systematic work methodology. This phase also includes a diversified evaluation link: through a combination of self-evaluation, peer evaluation, and teacher evaluation, students' learning outcomes are comprehensively assessed.

4.3 Repositioning of Teaching Objectives

The teaching model has systematically reconstructed the teaching objectives. On the basis of the traditional three-dimensional conversion competence, it adds technical literacy as a new dimension, forming a four-in-one competence framework.

In the linguistic dimension, the teaching objective expands from mere linguistic accuracy and fluency to the ability to evaluate, revise, and optimize the output of intelligent translation. Students need to master how to use technical tools to improve the quality of translated texts, making them meet the requirements of specific registers and styles. This includes the ability to critically analyze machine translation output and the ability to optimize translations with technical support.

The teaching objective in the cultural dimension emphasizes cultivating students' ability to identify and address algorithmic cultural biases. Students need to understand the cultural limitations of technical tools, master methods to correct cultural deviations, and ensure the accurate transmission and appropriate adaptation of cultural information in the translation process. This requires students to have an in-depth understanding of the cultural background of technical tools and be able to perceive their potential cultural presuppositions and value orientations.

The teaching objective in the communicative dimension focuses on developing students' ability to use technical tools to achieve deeper communicative purposes. Students need to master how to enhance the communicative effect of translated texts through technical means, including localization adaptation, selection of creative translation strategies, and processing of multimodal content. This requires students to not only focus on language conversion at the linguistic level but also consider the actual application effect of the translated text in the target context.

As the foundation supporting the previous three dimensions, the technical dimension focuses on cultivating students' ability to select and use technical tools appropriately. This includes skills in multiple aspects such as tool selection, prompt engineering, terminology management, and quality

evaluation. The cultivation of technical literacy not only emphasizes operational skills but also focuses on strategic thinking in technology application, enabling students to develop optimal technical solutions according to the needs of specific tasks.

4.4 Reconstruction of the Teaching Process

The teaching process design adopts a cycle model based on real projects, consisting of three key phases. The first phase is pre-adaptation and intelligent evaluation. Students use AI tools to conduct preliminary translation of the source text and systematically analyze the advantages and disadvantages of machine output. This phase focuses on cultivating students' ability to critically understand technical tools, requiring them to accurately identify the shortcomings of machine translation in terms of linguistic quality, cultural adaptation, and communicative effect. The second phase, human-machine collaboration and adaptive selection, is the core practical link. Aiming at the identified problems, students adopt different solution strategies, such as optimizing prompts, switching translation engines, and conducting in-depth post-editing. During this phase, students need to record the reasons and bases for each decision in detail to develop decision-making ability in a technical environment. Through process-oriented guidance, teachers help students establish a systematic problem-solving methodology. The third phase, critical reflection and competence internalization, focuses on experience summary and knowledge construction. By comparing different versions of translated texts, analyzing the advantages and disadvantages of various strategies, and conducting in-depth discussions on the best practices of human-machine collaboration, students deepen their understanding. This phase particularly emphasizes the recognition of the limitations of technical tools and the understanding of the irreplaceability of humans, helping students establish a correct perspective on technology. Through systematic reflection and summary, students transform specific practical experiences into transferable professional competencies.

This cyclic process emphasizes the organic integration of practice and reflection. After the completion of each project, a systematic summary is conducted, and the insights gained are applied to the next project, forming a spiral-up learning curve. Teaching evaluation runs through the entire process, focusing not only on the quality of the final results but also on the quality of decision-making and learning progress in the process.

5. Conclusion

Against the backdrop of changes in the translation ecological environment in the intelligent era, and addressing the practical issue that current translation teaching lags behind technological development, this paper constructs the "Intelligent Ecological Translation Teaching Model with Human-Machine Collaboration" based on the theory of Ecological Translation Studies. Future translation teaching should place greater emphasis on the in-depth integration of technology application and the essence of translation, continuously optimize the allocation of teaching resources, and strengthen the university-enterprise collaborative talent cultivation mechanism. By doing so, it can foster interdisciplinary translation talents who not only master advanced technologies but also possess solid professional literacy. This exploration provides valuable insights for the reform of translation education in the intelligent era.

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