

The Transformation And Breakthrough Of English Translation In The Intelligent Era

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Abstract: In the intelligent era of rapid development of artificial intelligence technology, the English translation industry is undergoing unprecedented changes and brings many challenges. In the context of the intelligent era, this paper delves deeply into the technical, quality and talent cultivation predicaments faced by the industry, and focuses on exploring three core paths: technological integration and innovation, construction of quality assurance systems, and transformation of talent cultivation models, aiming to provide theoretical references and practical guidance for the high-quality development of the English translation industry in the intelligent era.

Keywords: Intelligent era; English translation; Machine translation; Human-machine collaboration

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1. Introduction

The wave of intelligent technologies centered on artificial intelligence, big data and cloud computing is profoundly reshaping the development patterns of various industries around the world. The language service industry, as an important carrier of cross-cultural communication, is the first to be impacted and innovated. English, the most widely used common language in the world, has long held a central position in the fields of international trade, academic exchange, cultural dissemination and international cooperation through translation services. With the deep integration of intelligent technology and language services, and the wide application of Neural Machine Translation (NMT) systems, English translation has gradually shifted from the traditional human-led model to a collaborative model of ‘machine-assisted + human-optimized’ [1, 2].

Compared with the earlier development of machine translation research abroad, although related research in China has seen explosive growth in recent years, there are differences in research focus and system integrity between the two. The exploration of machine translation abroad began in the 1950s. After the emergence of neural machine translation technology, it entered a stage of rapid development. Scholars mostly focused on technical optimization. For example, Koehn et al. conducted in-depth research on the optimization of neural machine translation model architecture and proposed encoder-decoder models to improve accuracy. At the same time, in the field of human-machine collaboration, O'Brien et al. proposed a standardized process of ‘pre-translation preparation - machine translation - post-translation editing’ through empirical research. In terms of talent cultivation, they explored the integration path of translation professional technical courses and practical teaching in foreign universities, emphasizing the cultivation of technical application ability and interdisciplinary thinking. In addition, an intelligent translation quality assessment framework that combines objective indicators of the corpus with subjective human judgment was explored [3, 4]. Domestic research mainly focuses on three directions: first, empirical studies on the application and optimization of neural machine translation in professional fields such as law and medicine conducted by scholars like Wang Huashu; second, the construction of human-machine collaboration and division of labor mechanisms in different scenarios, proposing multiple models such as ‘machine translation + human post-editing’, The third is a study on the optimization of the curriculum system in response to the disconnection between the cultivation of translation professionals in universities and market demand, suggesting the addition of courses on intelligent translation technology and the implementation of project-based teaching, while domestic scholars have also explored issues such as industry ethics and copyright protection brought about by intelligent translation, but overall, there is a lack of systematic research on the path of English translation in the

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intelligent era in China. Most of the existing research focuses on a single dimension and has not yet formed a complete path system of ‘technology-quality-talent’ coordinated advancement [5,6].

In response to these problems, this paper systematically reviews the current development status and characteristics of English translation in the intelligent age, deeply analyzes the impact and innovation of technology integration on translation theory, focuses on the core path of English translation in the intelligent age, and constructs a three-dimensional analysis framework of ‘technology integration-quality assurance-talent cultivation’ to provide theoretical support and research paradigm reference for subsequent related studies.

2.Challenges Faced by English translation in the intelligent age

2.1 Technical challenges

Natural language processing (NLP), which is the core technology foundation of intelligent translation, has developed bottlenecks that severely restrict the improvement of English translation quality. At the same time, there are many limitations in current mainstream English translation software, which together constitute the technical obstacles to English translation in the intelligent era. In terms of natural language processing, the primary bottleneck is the insufficient depth of semantic understanding. The fuzziness, ambiguity and context dependence of natural language make it difficult for machine translation systems to grasp deep semantics as accurately as humans do. For example, the meanings of the English polysemous word ‘bank’ such as ‘bank’ and ‘riverbank’ are prone to translation errors due to misjudgment in complex contexts; The second is the lack of pragmatic reasoning ability, which makes it difficult to convey implied meanings in combination with factors such as the speaker’s intention and cultural background, such as the implied rejection or modification request in the English business negotiation ‘We need to consider your proposal carefully’, which cannot be accurately interpreted. In addition, the technique is prone to logical confusion when dealing with complex sentence structures such as long and difficult sentences and inverted sentences in English, and it is difficult to precisely control the rhetorical devices of literary works, the rhythm of poetry, or the tone and emotion of colloquial texts, resulting in the translation losing its literary quality or appearing stiff [7].

The limitations of the translation software further exacerbate the technical predicament. On the one hand, the lack of translation capabilities in specialized fields is a prominent problem. Although there is a large general corpus, the accumulation of specific specialized field corpora is scarce, making it difficult to achieve context-accurate translation of terms such as ‘tort’ and ‘negligence’ in the legal field, and even fatal errors may occur in the translation of disease names and diagnosis and treatment processes in the medical field; At the same time, the software has poor compatibility with various formats of documents such as PDF and Word, and complex format recognition is prone to typesetting disorder and content loss, increasing the translator’s subsequent workload. On the other hand, the risks of data security and privacy protection cannot be ignored. When dealing with sensitive texts such as business contracts and technical solutions of enterprises, the cloud processing mode may lead to information leakage; Due to the limitations of training corpora, translation software is prone to algorithmic biases such as gender and race, causing the translation results to lose objectivity and fairness. These technical bottlenecks, when combined with software limitations, make it difficult for machine translation to match human translation in terms of quality and applicability, especially in scenarios requiring deep semantic understanding and pragmatic reasoning.

2.2 Issues with translation quality and accuracy

Cultural background differences and insufficient context understanding are the core causes of quality deviations and errors in English translation in the intelligent age. The two are interrelated and jointly affect the accuracy and effectiveness of cross-cultural communication. The deep binding of language and culture determines that English translation is not only about the conversion of language symbols, but also about the precise transmission of cultural connotations. However, intelligent translation systems are prone to various translation deviations due to the lack of in-depth accumulation and understanding of cultural backgrounds. From the perspective of the differences in values

and thinking between China and the West, expressions in English that reflect positive Western values, such as ‘individualism’, when translated directly into Chinese with a negative connotation of ‘individualism’, can easily cause misunderstandings; From the perspective of differences in customs and taboos, cultural traits such as the taboo on the number 13 in the West are often overlooked by translation software, resulting in inappropriate expressions; Expressions such as ‘Trojan horse’ and ‘Noah’s ark’, which are derived from historical allusions and religious classics, cannot be translated literally to allow Chinese readers to understand their deeper meanings, further highlighting the lack of cultural adaptation [8].

Context, as the core environment for language usage, encompasses multiple dimensions such as context, situation, and culture, and plays a decisive role in translation accuracy. However, the insufficient context interpretation ability of intelligent translation systems can easily lead to translation errors. At the context level, the machine has difficulty accurately grasping the logical connections of the text, such as the ambiguity of the modifier object ‘with a telescope’ in the English sentence ‘He saw a man with a telescope’, which cannot be accurately judged when there is insufficient context information; At the situational context level, the machine is unable to adjust the translation style according to the formal context of an international conference and the casual context of everyday conversations, resulting in a disconnection between the translation and the usage requirements; At the cultural context level, although related to the cultural background differences in the preceding text, it focuses more on cultural adaptation to specific scenarios. For example, the polite expression ‘Looking forward to your early reply’ in English business emails has different requirements for euphemism in different cultural contexts, and the machine cannot adapt flexibly. Ultimately, it affects the translation. These problems are essentially due to the lack of intelligent systems’ perception of the humanistic connotations and usage scenarios behind the language, which has become a key bottleneck restricting the improvement of translation quality.

2.3 The demand for and cultivation of translation talents

In the intelligent age, the demand for talent in the English translation industry has undergone a fundamental transformation. The traditional ‘bilingual’ single-type talent can no longer meet the market demand, and the compound talent with interdisciplinary knowledge, technical application ability and professional quality has become the core demand of the industry. Specifically, these talents need to have a solid grasp of intelligent translation tools such as Trados and DeepL, as well as corpus construction techniques, be able to optimize the translation process according to task requirements, and have the ability to keep up with technological iterations through continuous learning; It is necessary to build a cross-disciplinary knowledge structure, be well-versed in professional fields such as law, medicine, and technology, and possess cross-cultural communication skills to avoid cultural biases in translation; It also requires a strong quality control ability, the ability to accurately evaluate and optimize machine translations, as well as the comprehensive ability to innovate translation strategies and coordinate large-scale projects.

However, there are significant shortcomings in the current translation education system in Chinese universities, which leads to a serious disconnection between talent cultivation and market demand. In terms of curriculum design, traditional language fundamentals, translation theory and human translation practice courses are still dominant, lacking technical courses such as machine translation principles and application of computer-aided translation tools, making it difficult for students to systematically master intelligent translation skills during their school years; In terms of practical teaching, the model is lagging and the scenarios are monotonous, with a focus on human translation training and a lack of human-computer collaboration practice. There is insufficient coverage of emerging translation fields such as technology and cross-border e-commerce, and students’ collaborative translation ability and adaptability to multiple scenarios cannot be cultivated. In terms of teaching staff, most teachers have a background in traditional language and literature, lack knowledge and practical experience in intelligent translation technology, and the depth of cooperation between universities and translation enterprises is insufficient, making it

difficult for students to have access to real projects and cutting-edge technologies in the industry. These problems have combined to create an industry predicament of ‘strong market demand and insufficient supply of compound talents’, restricting the healthy development of the English translation industry in the intelligent era.

3.Exploring the Path of English Translation in the Intelligent Age

3.1 Technological Integration and Innovation

The synergy of machine translation and human translation is the core path of English translation in the intelligent age. The key lies in clarifying the positioning and division of labor between the two to achieve complementary advantages, while optimizing the collaboration process and promoting standardization. In terms of the division of labor mechanism, work should be precisely assigned based on the type, difficulty and quality requirements of translation tasks: for simple and time-sensitive texts such as daily news and social information, the ‘machine translation + light post-editing’ model is adopted, with only simple optimization done by humans; For high-quality texts such as professional texts and literary works, the ‘pre-translation preparation + machine translation + heavy post-translation editing’ model is adopted, with human workers taking the lead in requirements analysis, terminology library construction and post-translation review; For real-time scenarios such as interpretation, the mode of ‘machine real-time translation + human monitoring and correction’ is adopted to ensure accurate and fluent expression. In terms of process optimization, by introducing computer-aided translation tools such as Trados Studio and integrating resources such as machine translation engines and terminology databases to build an integrated platform, it enables automatic translation generation, real-time invocation of terms, retention of modified content, and dynamic control of progress and quality, enhancing collaboration efficiency. At the same time, it is necessary to develop operational norms, quality standards, etc. for human-machine collaboration, promote advanced experiences through industry exchanges, and strengthen the standardization and consistency of collaboration ^[4].

In addition to the existing neural machine translation technology, emerging technologies such as big data, blockchain and metaverse offer new directions for the development of English translation and are expected to achieve industry breakthroughs. Big data technology can build more accurate corpora to support model training by integrating massive parallel corpora, domain corpora and user feedback, and at the same time predict market demand trends through data analysis to help enterprises reserve resources in advance, such as laying out terminology databases and translator resources for translation demand hotspots of cross-border e-commerce platforms. Blockchain technology, with its decentralized and immutable nature, can address issues related to the rights of translation works, copyright protection, and the security of sensitive text data, and can also build direct trading platforms to reduce the cost of translation services. Metaverse technology can create immersive environments such as virtual international conferences and cross-cultural scenarios, facilitating practical training for interpreters and enhancing the cultural adaptation ability of interpreters, while enabling real-time interactive translation among multilingual users and providing more natural and convenient language services for cross-cultural communication. The integration of these emerging technologies with existing collaborative models will drive the English translation industry towards a smarter, more efficient and safer direction.

3.2 Construction of a translation quality assurance system

Establishing scientific and reasonable translation quality assessment standards is the foundation for ensuring the quality of English translation in the intelligent age, and it should be advanced in three aspects: clarifying assessment dimensions, formulating differentiated standards, and building a diversified system. In terms of dimensions, it should cover accuracy centered on accurately conveying the meaning of the original text, fluency in line with the expression habits of the target language, completeness that fully covers the core content, cultural adaptability that fits the characteristics of the target culture, and consistency of terms that are unified and precise in professional terms, forming a multi-dimensional collaborative evaluation framework. In terms of differentiating criteria, the focus of the assessment should be adapted according to the text type. For daily communication texts, fluency and timeliness

should be emphasized; for professional texts such as law and medicine, accuracy, consistency and completeness of terms should be focused; and for literary works, cultural fit and literary style transmission should be emphasized. At the same time, in combination with the human-machine collaboration mode, distinguish the evaluation criteria for machine-translated initial drafts and post-edited translations. In building a diversified system, it is necessary to integrate objective quantitative evaluations from tools such as BLEU and METEOR with subjective qualitative evaluations from professional translators and demanders, supplemented by user feedback mechanisms, to ensure that the evaluation results are comprehensive and objective.

Post-editing and review are key links to enhance the quality of intelligent translation, and it is necessary to achieve full-process quality control through the improvement of mechanisms. In terms of process norms, follow the post-editing logic of ‘reading through to understand the original text - modifying the translation sentence by sentence - overall review and optimization’, focusing on correcting issues such as vocabulary, grammar, logic and cultural deviations, while clarifying operational norms such as modifying symbols and terminology standards to ensure editing norms. In terms of the review mechanism, a differentiated multi-level review is implemented. For important projects, the model of ‘translator self-review - project manager review - expert final review’ is adopted to control basic errors, project fit and professional accuracy at each level. For general projects, a two-level system of ‘translator self-review - human review’ is adopted to balance efficiency and quality. In terms of efficiency improvement, intelligent tools such as terminology consistency check and grammar detection are introduced to assist manual review. At the same time, a review database is established to record problems and revision suggestions to provide experience references for subsequent projects, forming a quality control closed loop of ‘standardized process + graded review + technology empowerment’.

3.3 Transformation of the translation talent training model

The urgent need for interdisciplinary and compound talents in the English translation industry in the intelligent era determines that translation majors in colleges and universities need to define the four-dimensional training goals of ‘language foundation + technical ability + professional knowledge + cross-cultural literacy’ and build an all-round talent training system. In terms of shaping core competencies, it is necessary to consolidate the foundation of English-Chinese language, strengthen students’ control of language details such as lexical collocation and semantic understanding, and lay a solid foundation for translation practice; Technical courses such as ‘Principles and Applications of Machine Translation’ and ‘Computer-Aided Translation’ should also be included in the training program, and students should be deeply involved in human-computer collaboration through school-enterprise cooperation practice projects to master practical skills such as post-editing and terminology database construction. At the same time, professional direction modules such as law, medicine, and cross-border e-commerce should be set up in line with market demand, and courses like Intercultural linguistics should be combined to enhance cross-cultural adaptation ability, and students should be encouraged to expand their interdisciplinary knowledge structure through minor and elective courses; Project-based teaching should also be used to develop students’ quality control, project management and teamwork skills, and to enhance their ability to apply technology and explore models through innovative practice.

To achieve the goal of cultivating compound talents, systematic optimization is needed in terms of curriculum design and teaching methods. In terms of curriculum design, we need to adjust the traditional curriculum structure, reduce the class hours of basic language courses, increase the proportion of technical and professional courses, offer interdisciplinary courses such as Translation and Artificial Intelligence, and ensure that the class hours of practical courses such as human-Computer collaborative translation practice account for no less than 30% to achieve a deep integration of theory and practice^[6]. In terms of teaching methods, project-based teaching should be implemented based on real projects, allowing students to participate in the entire translation process. For technical courses, the flipped classroom model is adopted to deepen understanding through pre-class self-study and in-class interaction;

Introduce intelligent teaching platforms such as Trados Teaching Edition to achieve simulated practice and precise guidance; Deepen school-enterprise cooperation, invite enterprise experts to give lectures, organize student internships, expose students to cutting-edge technologies and real projects in the industry, comprehensively enhance practical abilities, and ensure that the cultivated talents precisely match market demands.

4. Conclusions

Technological changes in the intelligent age are driving the English translation industry to shift from a traditional human-led model to a human-machine collaborative model, while also giving rise to three core predicaments: technology, quality, and talent. To break through these predicaments, a three-dimensional collaborative path of ‘technology integration - quality assurance - talent cultivation’ is proposed: At the technical level, deepen human-machine division of labor and collaboration and explore the application of emerging technologies. At the quality level, establish a multi-dimensional differentiated assessment system and a full-process review mechanism. At the talent level, define the four-dimensional training goals and optimize the curriculum teaching system. Only when the three work together can the industry achieve high-quality development.

In the future, the English translation industry will undergo a deep transformation towards intelligence, standardization, and integration. Empirical research on the application effects of large AI models in professional translation can be focused on in the future, and the coverage of case samples can be expanded; At the same time, delve into the changes in industry ethics and employment structure brought about by intelligent translation to provide a more comprehensive theoretical support for the sustainable development of the industry.

Disclosure statement

The authors declare no conflict of interest.

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