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Research on the Cultivation of Critical Thinking Ability Among Talents in English Translation of Zhuang Medicine in the Era of Generative AI

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Abstract: In the era of generative AI (GAI), translation is undergoing unprecedented transformations. GAI enhances translation quality and efficiency, inaugurating a new chapter in translation. However, due to its limitations, the complexity of translation, and the uniqueness of Zhuang medicine, cultivating the critical thinking ability among talents in English translation of Zhuang medicine has become critically important. This study reforms the teaching content, instructional design, and evaluation of the course Computer-Aided Translation Technology, and constructs a teaching model to enhance the critical thinking abilities among talents in English translation of Zhuang medicine. The result shows that this model establishes a critically thinking-oriented teaching system, promotes interaction between humans and machines, teachers and students, and among peers, and improves students' capabilities in translation, critical thinking, and social communication.

Keywords: Generative AI; Talents in English translation of Zhuang medicine; Cultivation of critical thinking ability

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1. Introduction

The rapid advancement of generative artificial intelligence (GAI) has brought about great changes in translation learning. GAI offers convenience for learners of Zhuang medicine translation in accessing information and enhances translation efficiency. However, given the limitations of GAI, the complexity of translation, and the uniqueness of Zhuang Medicine, learners are required not only to possess profound language proficiency and solid knowledge of Zhuang medicine but also to demonstrate higher-order thinking skills to analyze and evaluate AI-generated translations.

Critical thinking ability is the capacity to make purposeful and reasoned judgments about things or opinions based on criteria. It serves as a central goal of learning and a core requirement in higher education, holding an extremely important position in teaching and learning. Due to various factors in teaching content, instructional design, and assessment methods that are not conducive to cultivating thinking abilities, there is a

widespread phenomenon of "critical thinking absence" among foreign language majors [1]. In the era of GAI, how to facilitate the cultivation of critical thinking ability among talents in English translation of Zhuang Medicine has become an urgent issue to be addressed.

2. Characteristics of translation in the era of GAI

2.1. Balancing translation quality and efficiency

Traditional translation methods often require a trade-off between quality and speed, but GAI enables the achievement of both. In the field of translation, GAI technology has been widely applied to generate fluent target-language texts, particularly excelling in handling common sentences and expressions. Taking ChatGPT as an example, it outperforms traditional translation software in overall translation quality and performance, demonstrating remarkable accuracy in vocabulary and grammar [2].

2.2. Human-machine contextual interactive translation becoming the norm

GPT-4 has demonstrated contextual generation capabilities, forming a three-stage intelligent development pathway encompassing knowledge, capability, and value [3]. In other words, GAI like GPT-4 have transformed the traditional linear and singular mode of human-machine interaction in AI, showcasing contextual generation abilities. Translators can guide the model to generate more accurate and contextually appropriate translation results through contextual interactions, such as providing context, reference translations, and terminology interventions. Conversely, GAI can engage in self-learning and training based on translator feedback, continuously improving translation quality. This human-machine collaboration model not only enhances translation efficiency but also makes the translation process more intelligent and human-centered, gradually becoming the norm in the translation industry.

2.3. Customized and personalized translation becomes feasible

The contextual generation capabilities and human-machine interaction characteristics of GAI make customized and personalized translation possible. Translators can provide specific contexts or preference settings based on particular needs, training GAI to generate translations that align with specific scenarios and user requirements. For instance, GAI can adjust the translation style and tone according to user instructions, such as formal or informal, literary or colloquial, thereby personalizing the translation outcomes. Whether it is for business negotiations or daily conversations, GAI can offer tailored translation suggestions based on users' preferences and contexts, ensuring smoother and more natural communication. With the widespread application of GAI, personalized translation will become the new norm in language communication, significantly enhancing people's communication efficiency and quality.

In summary, the characteristics of translation in the era of GAI reflect technological advancements and changes in market demands, propelling the translation industry towards greater efficiency, intelligence, and personalization. Translators need to continuously learn and adapt to these changes, enhancing their skills and qualities to meet the demands of the times. Translation education also needs to reform its teaching models, cultivating students' abilities to apply GAI technology while scrutinizing its limitations and potential risks.

3. The necessity of cultivating critical thinking ability for talents in English translation of Zhuang medicine in the era of GAI

3.1. Requirements due to limitations of GAI

While GAI possesses powerful capabilities in natural language generation and communication, it also has certain limitations. The official website of OpenAI explicitly lists at least three limitations of GPT-4, including "social biases," "hallucinations," and "adversarial prompts" [4]. In the translation domain, it may display gender biases like translating neutral terms into gender-specific ones [5], and commit errors like "failing to recognize term morphology, inability to judge term semantics, inability to use standardized translations, and inability to employ conventional translations" [6]. Critical thinking enables learners to maintain independent thinking during translation, scrutinize AI-generated translations, and avoid blindly adopting them. Professional knowledge, on the other hand, provides theoretical support and practical guidance, ensuring the accuracy of translations. Only in this way can translation learners stand out in the GAI era and become leaders in the industry.

3.2. Requirements due to the complexity of translation

Translation is a complex cognitive activity involving different languages and cultures. Its complexity is prominently manifested in the "ambiguity, interference, and asymmetry" that are ubiquitous in the translation process [7], necessitating translators to collect and compare information to make precise judgments and selections. In this process, translators with strong critical thinking abilities can overcome cultural barriers and solve translation problems through conceptualization, judgment, and reasoning [8]. Therefore, cultivating learners' translational thinking abilities is pivotal in translation teaching, and nurturing thoughtful translators should be an integral goal of translation education [9]. However, current translation teaching overemphasizes practical skill training while neglecting the comprehensive cultivation of critical thinking, creativity, and holistic abilities, which is evidently inconsistent with the objectives of university education.

3.3. Requirements due to the uniqueness of Zhuang medicine translation

As an important component of Chinese medicine, Zhuang medicine boasts distinct characteristics, significantly differing from Western medicine. Meanwhile, influenced by Han culture, particularly traditional Chinese medicine (TCM), Zhuang medicine shares both differences and similarities with TCM. Therefore, translation of Zhuang medicine not only involves cross-linguistic and cross-cultural communication but also entails the transformation between different medical systems and modes of thinking. These unique features pose numerous challenges for both GAI and translators.

Firstly, Zhuang medicine possesses a unique theoretical framework encompassing concepts such as "balance of qi and blood" and "pathogenesis of toxicity and deficiency." These concepts exhibit significant cultural disparities from modern Western medicine in terms of historical context, theoretical foundations, and linguistic expressions. The philosophical thoughts and cultural connotations embedded in Zhuang medicine are often difficult for GAI to accurately convey in translated texts, as illustrated in Example 1:

Example 1:

Prompt: 请翻译为英文 壮医的三气，是指天气、地气、人气三种气及其运动变化。

Translation 1: The three energies in Zhuang medicine refer to the energies of heaven, earth, and humans, and their movements and changes (Chat GPT-3.5).

Translation 2: The three energies in Zhuang medicine refer to the three types of vital energy: the energy of the weather, the energy of the earth, and the energy of humans, along with their movements and transformations (ChatGLM).

In Example 1, GAI translates "□" as "energy," which fails to convey the rich connotations of the concept of "□" in Zhuang medicine. In Zhuang medicine, "□" is a complex and abstract notion that encompasses various aspects of nature and human vital activities. Using the transliteration method, "qi" can better preserve the original concept and its profound meaning.

Also, Zhuang medicine has enriched its unique theoretical framework by incorporating TCM theories such as yin-yang, qi-blood, and zang-fu organs [10]. Consequently, the theoretical system of Zhuang medicine shares similarities with that of TCM, and there are terms in both systems that have identical names and connotations, such as yin, yang, qi, and blood. Given that TCM translation has a longer history, there is an abundance of bilingual corpora available for GAI training. In contrast, Zhuang medicine translation is relatively nascent, with scarce bilingual corpora in both Chinese and English. As a result, when GAI responds to questions related to Zhuang medicine, it tends to generate texts that resemble TCM styles or even produce nonsensical content, as illustrated in Example 2.

Example 2:

Prompt: 请翻译为英文 壮医三道两路。

Translation: The phrase " 壮医三道两路 " refers to the traditional medical practices of the Zhuang ethnic minority group in China. Here is the English translation: "Zhuang Medicine's Three Paths and Two Routes." The three paths refer to the three main approaches or modalities used in Zhuang traditional medicine: Herbal Medicine; Massage/Manipulation; Divination/Ritual. The two routes refer to the two main ways the Zhuang medical practitioners diagnose and treat patients: Observing the patient's symptoms and condition; Asking the patient questions about their health (Claude 3.0)

In Example 2, Claude 3.0 grasped the meaning of " 壮 医 " and generated an explanation as "the traditional medical practices of the Zhuang ethnic minority group in China," and translated " 壮医三道两路 " into "Zhuang Medicine's Three Paths and Two Routes," essentially conveying the original information. However, if translation learners uncritically accept the remaining information, translating " 谷道 " " 水道 " " 气道 " as "Herbal Medicine," "Massage/Manipulation," and "Divination/Ritual," respectively, and " 龙路 " " 火路 " as "Observing the patient's symptoms and condition" and "Asking the patient questions about their health" in the context of TCM diagnostic methods, it would lead to severe mistranslations. Such errors not only fail to accurately convey the essence and characteristics of Zhuang medicine but may also adversely affect academic research and clinical applications in Zhuang medicine.

The distinctive features of Zhuang medicine, as outlined above, demand that learners of English translation for Zhuang medicine must thoroughly study and comprehend the unique theoretical system and terminology of Zhuang medicine. They should strengthen their understanding of the similarities and differences between TCM and Zhuang medicine, actively gather and organize bilingual corpora related to Zhuang medicine, and establish a terminology bank for Zhuang medicine. This will enable them to furnish GAI with more training data, ultimately optimizing its performance in the realm of Zhuang medicine translation.

4. Cultivating critical thinking ability for talents in English translation of Zhuang medicine in the era of GAI

The cultivation of learners' translational thinking abilities should permeate and be reflected in three dimensions: teaching content, instructional design, and teaching evaluation [9]. This study, taking these three dimensions as a framework and based on the course "Computer-Aided Translation Technologies," investigates the construction

of a teaching model conducive to fostering critical thinking abilities among talents in Zhuang medicine translation.

4.1. Teaching content

The teaching content aimed at cultivating learners' translational thinking abilities must be grounded in the dynamics and potential needs of economic and social development, emphasizing the contextual, contemporary, and communicative nature of translation [9]. In this study, the integration of GAI technology into the practical training of Zhuang medicine translation serves as the primary teaching content for the "Computer-Aided Translation Technologies" course.

On the one hand, with the improvement of GAI, it is reshaping the content, methods, and approaches of translation teaching. Incorporating the application of GAI tools into the teaching content reflects the new developments in societal advancement and the demands of the industry. On the other hand, the cultural heritage of Zhuang medicine in Guangxi is unique, boasting high cultural value and economic potential. Cultivating talents proficient in Zhuang medicine translation holds significant importance for promoting economic development and cultural exchanges in Guangxi. Integrating practical training in Zhuang medicine translation into the teaching content embodies the contextual, contemporary, and communicative aspects of translation.

The GAI tools involved in the teaching mainly include ChatGPT-3.5, GPT-4.0, Gemini, Claude, ERNIE Bot, ChatGLM, etc., covering the mainstream GAI tools both domestically and internationally at present. The specific learning content encompasses the evaluation of mainstream GAI tools in Zhuang medicine translation, the identification of common errors or biased outputs from GAI, the practice of human-GAI collaborative Zhuang medicine translation, and the construction and application of GAI-based terminology databases and translation memory databases for Zhuang medicine.

Taking the translation practice of commonly used acupuncture points in Chapter 6 of An Introduction to Zhuang Medicine Acupuncture and Moxibustion through human-GAI collaboration as an example, the teacher guides students to analyze the existing bilingual corpora of Zhuang medicine acupuncture points, extracting key terms and typical sentence patterns. Subsequently, the extracted corpora are utilized to train the GAI model, enabling it to conduct in-depth learning of relevant terminology and typical sentence patterns in Zhuang medicine acupuncture points, accurately comprehend the textual context and semantics of Zhuang medicine acupuncture points, thereby enhancing the accuracy of GAI translation. Meanwhile, students are guided to scrutinize the GAI translation results and perform necessary manual corrections to further improve the translation quality.

The practical training in Zhuang medicine translation primarily provides translation services for relevant Zhuang medicine materials (including paper abstracts, EI/SCI/SSCI papers, translated works, publicity materials, teaching materials, etc.) for faculty and students (including teachers, undergraduates, postgraduates, doctoral candidates, etc.) at our university. The practical training in Zhuang medicine translation not only requires students to master linguistic knowledge and translation skills but also demands a deep understanding of the cultural background and connotations of Zhuang medicine, as well as the linguistic and cultural characteristics of the target language. This ensures that the translations accurately convey medical knowledge while respecting and reflecting the characteristics of both cultures.

During the practical training, students are required to communicate effectively with teachers and clients, accurately understanding the requirements of teachers and the needs of clients, and responding in an appropriate manner and language. They should be able to react swiftly when faced with complex translation scenarios and

unexpected situations, promptly resolving issues. Moreover, students are expected to actively collaborate within translation teams, sharing knowledge and experiences to enhance translation efficiency and quality. By engaging with real-world translation projects, students can be exposed to authentic translation scenarios and demands, thereby honing their practical translation abilities and problem-solving skills.

4.2. Teaching design

In this study, the integration of GAI technology into the teaching process for cultivating students' critical thinking abilities is reflected in three stages: pre-translation, during-translation, and post-translation of each translation project. Below is a demonstration of a complete instructional design process using the translation practice of Chapter 2, "Theoretical Foundations of Zhuang Medicine Acupuncture and Moxibustion," from the monograph An Introduction to Zhuang Medicine Acupuncture and Moxibustion as an example.

4.2.1. Pre-translation stage

The students involved in this research are postgraduate students specializing in Traditional Chinese Medicine (TCM) translation, with a total of 14 students divided into 4 groups of 3–4 members each. Before class, each group selects and registers for different mainstream GAI tools designated by the teacher and familiarizes themselves with them. During class, after a brief demonstration by the teacher, students input the first round of prompts into their registered GAI tools to extract terms from the text to be translated. They then input the second round of prompts to match the extracted terms with the existing Zhuang medicine terminology database provided by the teacher. If a match is successful, the translation from the database is directly adopted; if not, students train the GAI by inputting term explanations, contextual information, etc., to ensure accurate understanding of the terms, and then input the third round of prompts to generate term translations. Throughout this process, the teacher circulates to observe students' operations, offering timely suggestions or prompts to guide them in adjusting their prompts for optimal results.

Next, students within each group compile the term translations generated by different GAI tools, conduct a comparative analysis of the various translation results, discuss and select the best translations, review and verify questionable translations, and form a bilingual glossary for submission to the teacher. Meanwhile, each group summarizes and organizes content such as the comparison of GAI tool usage, experience in crafting prompts, encountered problems and solutions, and the argumentation process for controversial translations, presenting it in class in the form of a PPT. The teacher guides students in evaluating and reflecting on the presented content, discussing and arguing over controversial translations, and ultimately establishing a standardized and unified project terminology database.

4.2.2. During-translation stage

Before class, each student imports the terminology database established during the pre-translation stage into the GAI tool for term intervention. After necessary pre-translation editing of the original text, they obtain an initial translation generated by the GAI tool. They critically review the translation, revise erroneous translations, and verify, analyze, synthesize, compare, and make judgments and decisions on questionable translations, recording the verification, analysis, and deliberation processes in the form of annotations. Subsequently, students within each group compile their respective translations, conduct a comparative analysis, select the best translations, revise and optimize less satisfactory ones, and submit the final translations to the teacher. During class, each group presents a report in the form of a PPT on the use of GAI tools and the translation progress of

the project, summarizing term intervention techniques, pre- and post-translation editing skills, and reporting on the argumentation tools, processes, and reasoning for controversial translations, reflecting on deficiencies and issues encountered during the translation process. The teacher guides students in comparing translations generated by different GAI tools, evaluating their merits and demerits, considering the characteristics of the original text, Zhuang medicine culture, and translation requirements. For PPT presentations, the teacher guides students in summarizing usage strategies for different GAI tools, comparing their advantages and disadvantages, and reflecting on the reliability, relevance, and rationality of the argumentation processes. Finally, controversial translations are discussed, analyzed, and revised to form the final translations.

4.2.3. Post-translation stage

After class, students write reflections, revisiting the project translation process, analyzing encountered problems, summarizing solutions, and contemplating how to optimize the translation process to enhance efficiency and quality. They apply the knowledge and skills learned in this project to new translation projects, establishing a bridge between knowledge and skills through repeated practice and continuous reflection, thereby deepening their consolidation and continuously improving their critical thinking abilities. The teacher reviews students' reflective journals, providing one-on-one feedback, guiding them in actively raising questions, analyzing problems, and exploring different solutions. Meanwhile, students are encouraged to select one or two GAI tools and train them using existing bilingual Zhuang medicine corpora (such as terminology databases and bilingual parallel corpora) to explore customized and personalized GAI application schemes, cultivating their practical abilities and innovative spirit.

4.3. Evaluation of teaching effectiveness

In the GAI era, the scope of a translator's professional competencies has expanded, and traditional single-dimensional knowledge-based assessments are no longer sufficient to meet practical demands. Translation teaching evaluations should encompass students' abilities to utilize GAI tools to solve translation problems and their critical thinking capabilities. This study adopts a combined approach of formative evaluation (70%) and final summative assessment (30%) to comprehensively evaluate students' abilities in applying GAI tools for translation practice and the improvement in their critical thinking skills.

The ongoing assessment includes four components: translation tasks with translator's annotations (20%), in-class group PPT presentations (20%), individual reflective journals (20%), and attendance (10%). The final examination requires students to complete an English translation task of approximately 1,000 words related to Zhuang medicine within 120 minutes using GAI tools. They must submit an annotated translation (20%) and a 500-word reflection (10%).

Practice has demonstrated that integrating GAI technology into the teaching content, process design, and assessment methods of Zhuang medicine translation training can significantly enhance students' critical thinking abilities. During the pre-translation stage, students extract terms and construct a terminology database using GAI tools, honing their information screening and processing skills. During the translation stage, by comparing and analyzing different translations and evaluating the strengths and weaknesses of various GAI tools, students cultivate their critical thinking skills. In the post-translation stage, writing reflective journals improves students' self-reflection and self-improvement capabilities. The evaluation system, which combines formative and summative assessments, comprehensively evaluates students' improvements in GAI application, critical thinking, and translation abilities.

5. Conclusion

In the era of GAI, the field of translation is undergoing unprecedented transformations. GAI technology not only enhances translation quality and efficiency but also ushers in a new chapter of human-machine interactive translation. Given the limitations of generative AI, the complexity of translation, and the uniqueness of Zhuang medicine, it is imperative to prioritize the cultivation of critical thinking skills when training English translators for Zhuang medicine.

Based on Professor Li Ruilin's teaching philosophy, this study has constructed a teaching model aimed at cultivating critical thinking abilities among Zhuang medicine translation talents. This model integrates generative AI technology with Zhuang medicine translation training, fostering an open, multidimensional, and intellectually stimulating teaching system. It creates an environment conducive to independent thinking and free exploration for students, thereby enhancing their critical thinking, translation, and communication skills.

This teaching model can be extended to the cultivation of translation talents in other fields, helping students enhance their abilities to think independently and solve problems in the translation practice of the GAI era, so as to adapt to the increasingly complex and ever-changing demands of the translation industry.

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