

Research and Inspiration on Man-Machine Interaction Writing Practice Based on ChatGPT

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ABSTRACT

The generative artificial intelligence technology represented by ChatGPT has brought enormous opportunities and challenges to man-machine collaborative writing. To further explore the potential value and risks of ChatGPT in man-machine collaborative writing, this study attempts to explore the similarities and differences between students with different academic training backgrounds and ChatGPT man-machine collaborative writing through a comparison of practical cases. Research has found that: firstly, students who are familiar with the topic ask specific questions and can engage in conversations with ChatGPT through questioning methods such as judgment or questioning. This process is not only rewarding but also relatively enjoyable; Secondly, students with publishing experience can identify problems in ChatGPT language expression and writing ideas, and select and process the generated content; Thirdly, the role played by ChatGPT in man-machine collaborative writing is influenced by the academic training background of students. Students who are competent will be more efficient through ChatGPT. Given this, educators can encourage students to ask and pursue ChatGPT about their writing content, and analyze the impact of different questioning methods on the quality of ChatGPT generated content.

KEYWORDS

Writing assessment; AI-assisted writing; Writing mutual evaluation; Learner's engagement; Learner's belief

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1 Introduction

Generative artificial intelligence, represented by ChatGPT, has brought enormous opportunities and challenges to human-machine collaborative academic writing. Generative artificial intelligence can not only clearly understand users' questions and respond based on them, but also generate text, write abstracts, and translate text. Some studies have found that even expert reviews can only recognize 63% of abstracts generated by ChatGPT (Gao, et al., 2023). The journal Nature conducted a survey on their readers regarding the use of ChatGPT in scientific research, and found that respondents used the tool for brainstorming, writing research drafts, or conducting literature reviews. These respondents believed that ChatGPT could help them complete boring, heavy, or repetitive tasks, but it also brought about issues such as academic fraud and misconduct (Owens, 2023). After reviewing the development and application of intelligent writing technology in China, Jin Haoyue et al. (2023) found that some university students have started to use intelligent writing platforms to help improve their writing

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skills, but such technologies also pose a risk of academic misconduct. Therefore, a comprehensive study is needed on the potential uses, limitations, and ethical risks of such tools. However, the current debate on the impact of ChatGPT on academic writing mainly comes from experienced educators and researchers, with a relative lack of voices from students, especially empirical research on student human-machine collaborative academic writing. In view of this, this study will explore the similarities and differences between graduate students with different academic training backgrounds and ChatGPT human-machine collaborative academic writing through case comparison. The aim is to help educators deeply understand the potential value and ethical risks of ChatGPT in human-machine collaborative academic writing, and based on this, to better formulate relevant policies, while also providing suggestions for the future development of human-machine collaborative academic writing.

(1) Literature review

Only through systematic training can graduate students have the ability to express academic research processes and achievements in abstract academic discourse. However, due to limited time and energy, teachers are unable to provide effective guidance to each student. Many students often fall into a confusion of not knowing how to proceed due to a lack of prior academic accumulation and correct understanding of academic paper writing.

Previous research suggests that ChatGPT has brought new opportunities for the development of academic writing. The application potential of ChatGPT may overturn traditional scientific research methods, such as changing the modes of acquiring scientific research knowledge, designing and planning scientific research experiments, and writing scientific research result. The study found that ChatGPT can not only process raw data, but also write and polish initial drafts, resulting in smooth and standardized articles (Conroy, 2023). Similarly, it is exploring the impact of generative artificial intelligence such as ChatGPT on writing recruited 453 university educated professionals from various industries and asked participants to collaborate with ChatGPT to write their actual work tasks. After completing the initial task, participants were randomly divided into an experimental group and a control group. Through time statistics, it was found that the experimental group completed the second task much faster, taking an average of 16 minutes, while the control group took an average of 27 minutes. This study asked three experienced professionals to rate the quality of generated text on a scale of 1-7, and found that the group using ChatGPT scored 18% higher than the group not using ChatGPT. In addition, participants who scored lower in the first task scored 1-2 points higher with the help of ChatGPT, while those who initially achieved high scores maintained high scores even after using ChatGPT. This indicates that ChatGPT is particularly helpful for those with relatively weak writing skills, as it can elevate their writing level to a level close to that of skilled individuals (Noy, et al., 2023).

At present, empirical research on human-machine collaborative academic writing is just in its infancy. The false information, academic language expression issues, and obstacles to thinking development in ChatGPT have also attracted the attention of scholars. Some scholars believe that the false information generated by ChatGPT may distort scientific facts and spread erroneous information. For example, it fabricated a convincing abstract, but there were issues with factual errors, false statements, and incorrect data. More importantly, the abstract exaggerated the effectiveness of the study (Van Dis, et al., 2023). Due to the need for certain abilities to identify false information, some scholars (Han, et al., 2023) suggest that undereducated student groups should not embrace ChatGPT too early. Some scholars believe that ChatGPT has problems with academic language expression. The academic misconduct caused by this is even more worrying for scholars (Owens, 2023).

In summary, existing studies have shown that ChatGPT brings many opportunities and challenges

to academic writing. The few empirical studies mainly focus on the effectiveness of human-machine collaborative writing, and there are few studies exploring the process and influencing factors of human-machine collaboration. In the field of graduate writing in universities, research has shown that academic writing for graduate students requires a solid foundation of subject professional knowledge. In addition, graduate students who have had academic paper training and publication experience have better performance in identifying problems, and conducting research.

(2) Research design

This study adopts a multi case comparison research method, which is an important research method for proving causal inference and revealing causal mechanisms (Eisenhardt, 1991). We recruited participants online in early January 2023, with a total of 13 graduate students registering and selecting them using the “most similar case” selection method (Gerring, 2008). Finally, we invited 4 graduate students, numbered A, B, C, and D in the order of participation. They are from the fields of chemical engineering and food science engineering, and both are the first to collaborate with ChatGPT in academic writing. The topics for the human-machine collaboration papers of the four participants are all research topics they are currently conducting. Among them, A and C, two students who are first year graduate students, are still in the exploratory stage of their research and are not familiar with the topic selection; B's topic selection is related to his undergraduate thesis, while D's topic selection is related to her doctoral thesis. They are relatively familiar with the topic selection. Meanwhile, two students A and D have published papers. The paper published by A is not related to this topic, while the five papers published by D are all related to this topic, while B and C have no paper publishing experience.

The specific human-machine collaborative academic writing method and end time are determined by the participants themselves, and the researchers did not plan in advance. In addition, in order to better understand graduate students' attitudes and perspectives on human-machine collaborative academic writing, the researchers invited four observers out of the remaining nine students. Their main task was to observe the entire process of human-machine collaborative academic writing of four classmates and record their own feelings during the observation.

1) Research process

To better document the collaborative academic writing process between participants and ChatGPT, each case is presented by a participant through Tencent Meeting sharing screens and “Think Aloud” to demonstrate the process of human-machine collaboration. This process mainly includes: (1) Participants input instructions; (2) ChatGPT generates corresponding content based on instructions; (3) Participants can start a new topic or input instructions again based on the generated content until satisfactory content is generated. This method not only provides researchers with the opportunity to understand participants' thoughts in human-machine collaboration, but also explores the content, process, and results of participants' thinking. Human-computer collaborative academic writing is conducted in the Chinese context. With the consent of the research subjects, the researchers recorded the entire process of human-machine collaboration in four cases, and ultimately obtained a total duration of nearly 11 hours of video.

2) Subtitle data

To better understand the differences in “questioning” among different participants in human-machine collaborative academic writing, the researchers referred to the questioning structure, which consists of core questioning and various follow-up questions. Based on the actual situation of

"questioning" data, the analysis dimensions were divided into five categories: indication, evaluation, demonstration, follow-up, and continuation.

3) Data collection

The data of this study includes three aspects: (1) data on the collaborative process between participants and ChatGPT, including the duration of collaboration in each case, the number of conversations, the content of participants' questions, and the text content generated by ChatGPT; Based on the actual situation of "questioning" data, the analysis dimensions were divided into five categories: indication, evaluation, demonstration, follow-up, and continuation. The three main questions for participants and observers are "What is your attitude and opinion towards ChatGPT", "What value or issues do you think ChatGPT has in academic writing", and "What is your opinion on human-machine collaborative academic writing".

(3) Second section

Preliminary analysis of participants' voice thinking data revealed that this data mainly reflects their evaluation and collaborative feelings towards the content generated by ChatGPT. To better understand the evaluation types of participants, the researchers referred to the classification of teacher response to student responses by American psychologist Sternberg (2000), and combined with the actual situation of voice thinking data, divided the analysis dimensions into four categories: approval, doubt, disapproval, and others. Two researchers independently encoded the question data and voice thinking data during the human-machine collaborative academic writing process based on it. Even in the present, it is almost futile and meaningless to strive to understand what GPT-4 cannot do, and to better understand it and explore its practical value is more meaningful. In this sense, we should avoid two common tendencies.

One is to prevent students from using artificial intelligence represented by ChatGPT. The reason why many people do this is that artificial intelligence is very good at personal narratives and the dissemination of general knowledge, sometimes reaching the point where fake information can be confused with real information. But in fact, in today's technologically advanced world, unless the network is disconnected or strongly blocked, this prevention will be in vain.

The second is to expect software detection to generate text. It is obvious that articles generated by artificial intelligence and articles written by humans will become increasingly difficult to distinguish. Because students can input their past paper models into artificial intelligence programs and have them generate drafts in this style. In other words, ChatGPT can write (intentionally) articles with errors after being embedded with writing characteristics (including errors).

1) Data analysis

The numbers accorded to equations must appear in consecutive order inside each section or within the contribution, with number enclosed in brackets and set on the right margin, starting with the number. In the face of artificial intelligence, there is a tendency worth paying attention to, which is that many people always try to test or explore areas where artificial intelligence is not currently good at. When artificial intelligence shows inability, incompetence, or even errors, they will mock artificial intelligence and prove that it still has a significant gap with humans. In fact, the power of GPT-4 has already warned us that the inability, incompetence, and even errors of artificial intelligence in the current era are just that humans have not yet given it enough data. Otherwise, the energy it releases will far exceed people's expectations.

Firstly, we need to change the past scoring principles and evaluation standards. If ChatGPT can produce smooth but boring articles, then language fluency should not be an important indicator of evaluating the quality of the article. We should require students to demonstrate a comprehensive ability and to answer the questions we ask with unique perspectives and wisdom, or to showcase their own ideas and viewpoints.

Secondly, it is important to emphasize the motivation and value of students' attention to writing. We should make students more aware of the important value of writing behavior itself and emphasize the importance of the writing process. Nowadays, people often value completed texts, but we should place more emphasis on the process of writing. At the same time, we should inform students that writing practice is the core of intellectual development in universities and will bring them huge rewards. Therefore, we should encourage students to actively write.

Finally, more emphasis should be placed on the originality and uniqueness of the article. At present, although GPT can already imitate certain original critical thinking results, it has not yet produced truly original content. Therefore, pursuing the originality and uniqueness of academic articles will be a top priority for future writing.

2 Conclusions

Firstly, participants familiar with the topic believe that ChatGPT has certain application value in human-machine collaborative academic writing, while participants unfamiliar with the topic believe that its application value is limited. Compared to the familiarity with the topic, the impact of having or not having published experience on value judgment is not significant. The views of the observer are basically consistent with those of the participants. In summary, B, who is familiar with the topic, believes that Chat GPT can serve as a learning partner, while D, who is familiar with the topic, believes that it can save time. Similarly, observers have discovered many auxiliary values of ChatGPT in these two cases, such as providing writing ideas and serving as academic assistants. In comparison, both A and C, who are unfamiliar with the topic, believe that ChatGPT has no significant application value in academic writing. The observer's views in these two cases are basically consistent with those of the participants. However, there is a slight difference. In case A, the observer first understood the generation performance of ChatGPT and believed that ChatGPT had the value of serving as a writing assistant. However, in case C, the four observers also believed that its application value was very low. In summary, participants and observers' value judgments of ChatGPT in human-machine collaborative academic writing are influenced by the role played by ChatGPT. The better ChatGPT performs, the more participants and observers can see its value. In addition, both participants and observers make judgments on the value of ChatGPT from a tool perspective.

This can to some extent compensate for the lack of guidance in traditional academic training. However, this study found that ChatGPT poses a risk of increasing student inertia. It is pointed out that with the assistance of ChatGPT and others, academic writing may become easier, but it may also become more mediocre.

In short, human-machine collaborative academic writing is not "seeking new topics". The accumulation of professional knowledge and basic academic writing skills in traditional academic writing are still the key and foundation of human-machine collaborative academic writing, while generative artificial intelligence is only a tool and carrier to assist scientific research. If used properly, this will be a capable research assistant; If used improperly, it not only leads to academic misconduct, but also causes learners to overlook the improvement of their academic abilities, leading to the

relaxation and desertification of their own intelligence. Faced with the opportunities and challenges brought by generative artificial intelligence such as Chat-GPT, it is necessary for university teaching and research departments, teachers, and students to work together to maximize machine efficiency while preventing the drawbacks brought by machines. In short, it means that humans guide machines, rather than machines dominating them.

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