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The Synergy between ChatGPT and Human Instructors in Large Language Models

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Abstract: Artificial intelligence (AI) is evolving in a way that makes the distinctions between certain fields of application fuzzier and increases its capacity to be applied in a variety of contexts. A significant step in this direction has been made with the public's availability of ChatGPT, a large languages model (LLM)-powered generative AI chatbot. Professionals expect this technology will impact education and the job of teachers as a result. Nevertheless, how instructors might really utilize the technology & the nature of its connection with teachers remain understudied, given some presumptions regarding its influence on education. In this study, ChatGPT's interaction with instructors was investigated with an emphasis on understanding the complimentary functions that each play in education. Over the course of two weeks, ChatGPT was requested to be used by eleven language instructors. They subsequently shared interaction logs created during their usage of the device and took part in individual interviews to discuss their experiences. Four ChatGPT roles—interlocutor, content provider, teaching assistant, and evaluator—and three teacher roles—orchestrating various resources with quality pedagogical decisions, empowering students as active investigators, and fostering AI ethical awareness—were identified through qualitative analysis of the data. The potential application of LLM-powered chatbots for educational purposes is also discussed, along with its implications.

Keywords: ChatGPT, Large Language Model, Chatbot, Artificial Intelligence, AIEd, Human-Computer Interaction, Large Language Models-Powered Chatbot

I. INTRODUCTION

In recent years, there has been a lot of interest in the use of chatbots to improve students' language learning experiences (Huang et al., 2023; Hwang et al., 2020; Jeon, 2021; Jeon, 2022a; Lee & Jeon, 2022). Language researchers have used a variety of chatbots, including those developed in research laboratories and those created commercially, and they have identified the innovative teaching opportunities that chatbots offer (Dizon, 2020; Fryer et al., 2020; Huang et al., 2022). Even though chatbots can help with language acquisition, many flaws in the present chatbot systems have also come to light (Bibauw et al., 2019; Jeon, 2022b). The inability of chatbots to participate in open-ended dialogues with learners and to maintain a lengthy and goal-oriented discourse on a particular topic are two examples of this (Kuhail et al.2022).

A significant development in artificial intelligence (AI), namely natural language processing (NLP), has been made with the latest general availability of ChatGPT (Brown et al., 2020). According to predictions made by researchers (Heidt, 2023, and Kasneci et al., 2023), the large language model (LLM) which underpins the generative AI chatbot ChatGPT will be able to overcome many of the drawbacks of earlier chatbot technology. This will eventually affect how people learn.

For a review of current educational chatbots, see Kuhail et al., 2022. In contrast to the majority of currently available chatbots, which follow predefined dialogue paths or have simple question-and-answer dialogue structures, this exponentially more sophisticated chatbot can generate answers in accordance with the context of a given prompt, and can therefore engage users. The growing acceptance of ChatGPT, as seen by the quickly expanding number of registered users, implies that this kind of technology is ready to be more thoroughly ingrained into society (Altman, 2022). Because of this, educators expect significant changes in several areas of higher education, including the job of teachers (Stokel-Walker, 2023). It may replace some jobs now held by instructors as it demonstrates its ability to deliver fresh resources that augment learning experiences beyond those offered by conventional techniques and by current chatbot technology (Jeon, 2022b). Teachers might use the qualities of this chatbot, as indicated in early theoretical investigations on the use of technology (Kasneci et al., 2023; Zhai, 2022), to encourage students to engage with the material in their textbooks.

Additionally, teachers may charge students with the first grading work. On the other hand, some researchers have voiced worry that some instructors may become overly reliant on ChatGPT and fail to provide opportunities to enhance students' imaginative thinking, critical thinking, and problem-solving skills. This is according to Kasneci et al. (2023).

2 BACKGROUND IN LITERATURE

2.1Language-learning chatbots: ELIZA to ChatGPT

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Chatbots have seen several technological advancements since the creation of ELIZA, the first NLP-powered chatbot (Weizenbaum, 1966), hence expanding its potential for pedagogical application as a tool to help students' language acquisition. Three different kinds of chatbots have been used in the field of language learning, according to Jeon (2022b): (1) general-purpose chatbots that can have simple, everyday conversations with users using question-and-answer dialogue structures (such as Dizon, 2020; Fryer et al., 2019); (2) specialized chatbots that operate with more complex structures created by businesses for language learning (such as Wang et al., 2023); and (3) personalized chatbots developed by researchers.

Some of the drawbacks of earlier chatbots have been successfully solved by the most current version of ChatGPT, a very powerful generative AI chatbot driven by an LLM. The general efficacy of Educational and Information Technologies NLP applications was significantly improved using an LLM, an instance of artificial intelligence model that is trained using a large dataset of human language (Brown et al., 2020). As a result, it makes it feasible for chatbots to produce a greater variety of human-like replies than before [10].

2.2 Relationships between humans and AI that are complementary in education

The recent influx of AI into educational settings has drawn attention from scholars, who argue that human-AI collaboration can produce more effective learning than either humans or AI working alone (Holstein et al., 2020; Kim et al., 2022; Xu & Ouyang, 2022). Instead of considering AI as a possible teacher replacement, this line of research emphasizes the agentive activities of teachers and describes them as enabling the good influence of AI on education (Bower, 2019; Jeon et al., 2022). For instance, Holstein et al. (2020) offered four groups for places in which human teachers may increase the flexibility of AI technology: goal augmentation, perceptual augmentation, activity augmentation, and decision augmentation. They did this through using framework for adaptivity in education. examined 24 papers on the use of chatbots for language acquisition, concentrating on how instructors and chatbots work together. They discovered that there was little empirical data supporting teacher-chatbot collaboration. built around the notion of a classroom Dillenbourg and Jermann (2010) recommended that scholars look at the cooperation between teachers and chatbots has promise, necessitating additional empirical [9]

3 TECHNIQUES

In order to understand the pedagogical benefit of an LLM-powered chatbots and how instructors believed their duties would alter with the introduction of the technology, researchers utilized an exploratory qualitative method (Creswell, 2008). To do this, we gathered information from two sources: instructors' chatbot use logs as an unbiased complement to the interview data, and individualized semi-structured conversations as a primary source.

3.1 Users and the chatbot

In recent years, chatbots have emerged as a significant topic of research and development, with an increasing focus on understanding user behavior and enhancing chatbot performance. These conversational agents, powered by artificial intelligence and natural language processing, have become an integral part of various applications, including customer support, virtual assistants, and educational tools. Researchers have explored different approaches to improve chatbot interactions with users.

Understanding user intent and context is crucial for successful chatbot engagement. Natural language understanding (NLU) techniques, such as intent recognition and entity extraction, have been employed to decipher user queries accurately. Additionally, sentiment analysis helps chatbots gauge users' emotions and respond appropriately, contributing to a more empathetic user experience.

Machine learning and deep learning algorithms have been pivotal in enhancing chatbot capabilities. Supervised and unsupervised learning methods have been leveraged to train chatbots on large datasets, allowing them to learn from historical interactions and generate contextually appropriate responses. Moreover, reinforcement learning has enabled chatbots to learn from user feedback, leading to continuous improvement in their conversational abilities.

To ensure that chatbots address user needs effectively, researchers have also focused on mitigating biases and maintaining ethical considerations in chatbot design. By providing diverse training data and adopting fairness-aware learning, efforts have been made to reduce biased responses and treat all users equitably. (OpenAI, 2023).

3.2 Procedures

The steps taken in this research are shown in Figure 1. The use of ChatGPT by the hired teachers took place from Jan to February 2023. Each teacher followed the instructions separately. The instructors initially took part in a 60-minute lecture delivered by one of the study's researchers, who first explained the goals and methods of the study as well as how their interview replies & interaction log data would be handled in upcoming reports and publications. They gave their informed permission knowing that they might withdraw at any time. The participants spent around 20 minutes being introduced to

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ChatGPT and learning about the chatbot's fundamental features, such as how to establish an account to access the chatbot and discussion. A demonstration of the chatbot's responses to various inquiries was also shown. The remaining portion of a meeting, which went on for for about 40 minutes, was devoted to a Q&A session where the presiding the investigator and a teacher answered inquiries from those who attended, such as whether specific educational prompts were to be understood or how they could formulate questions more precisely to gather precise information. The researcher and instructor worked together to find answers by entering precise suggestions or questions and discussing the results in order to address their questions. The participating instructors utilized ChatGPT in their individual teaching contexts anyway they saw fit over the two weeks that followed the session. It was highlighted that if ChatGPT was utilized responsibly to support teaching and learning, there were no limitations on how it may be used. Additionally, they were required to compile up to 10 notable or controversial usage patterns in the form of chatbot interaction logs. Following the two weeks, the instructors took part in one-on-one semi-structured interviews with a researcher where they discussed their experiences with ChatGPT and their opinions on it. The interviews averaged 60 minutes in length and were audio-recorded, transcribed, and in some cases, translated into English.

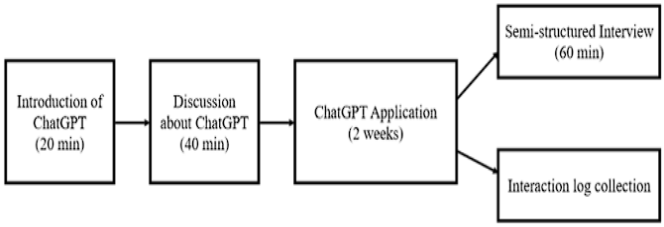

Fig.1 Research Procedures

3.3 Gathering and analysing data

The informal in-depth interview transcripts and the instructors' chatbot interaction records served as the data sources. In accordance with the interviewing guide used by Timpe-Laughlin et al. (2022) in an investigation of teachers' experiences with and attitudes on the usage of a chatbot system, semi-structured procedures for the interview process were devised. The following questions served as the framework for the interviews:

- Can you describe your experience with the chatbot?
– Did you find utilizing chatbots to teach English to be useful? If so, which chatbot features proved to be the most helpful?
– What pedagogical tasks do you believe using the chatbot will make simpler or more crucial?
– Do you believe that this kind of technology will eventually replace teachers? If not, why not?

Initial inquiries were created to collect instructors' overall impressions of and experiences using ChatGPT considering the exploratory nature of the project. The focus of the following questions was on the roles that the teachers played while utilizing ChatGPT.

To find recurrent trends in meaning that were relevant to the study topics, the transcriptions of interview data were next submitted to a qualitative analysis. The analysis was conducted in line with Braun and Clarke's (2006) approach, which included several procedures. In order to have a broad comprehension of the data, we first independently reviewed the transcribed data. Then, using the information from the interviews from both study's teachers, we each established a preliminary coding scheme by going over the transcripts to look for emerging themes, with a focus on both study objectives (i.e., specific applications of ChatGPT and instructor roles), as well as subcategories within each of the themes. We contrasted each of our analyses and used a method that consisted of several rounds of discussion to settle disagreements. The remainder of the interview data was then separately subjected to the reconciled coding. As advised by Lombard et al. (2002), we calculated the outcomes of the coding procedure and came up with a Cohen's Kappa measurement of 0.89, which demonstrates an elevated degree of inter-coder reliability. The remaining differences were subsequently settled through additional conversation. We determined frequency counts of replies for coding in order to identify and analyse pattern and topical trends in the data. To record response trends in the teachers' own words, representative replies were taken. The roles defined by ChatGPT were then identified, and the interview data was supplemented, using the teacher-chatbot interaction records. The teachers' submitted interaction transcripts were all carefully examined. For the sake of simplicity and since readers may immediately access chatbot replies using the instructor-provided prompts by visiting https://chat.openai.com/chat, we have only included teacher prompts that have been taken from the interaction logs. To confirm the chatbot's duties, the chosen questions were shown with interview extracts [1].

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6 LIMITATIONS

Future research should consider some of the limitations of this study. Initially the participants were chosen based on their willingness and interest in using ChatGPT. This suggests that they could have been more comfortable using technology than most instructors. The results may not be widely generalizable because the sample for this study only included just a handful of English instructors employed at primary schools in one nation. Additionally, we looked at participant instructors as a single group without considering their distinctions. For a more thorough understanding of teachers' employment of LLM-powered chatbot to promote deeper theorizing, future investigations should involve instructors from a varied variety of topics, school levels, nations, and views toward technology. Second, the experiences and perspectives of students were not included in this study. An analysis of Chat- GPT usage from the viewpoint of students, such as a qualitative examination of students' perceptions or a quantitative analysis of the chatbot's impact on students' performance or motivation, will serve as a significant contrast to this investigation. This would be a valuable and intriguing addition to the research. The impact of teachers' prior encounters with AI and their influence on their adoption or usage of LLM-powered chatbot as instructional aids should also be examined considering the pervasiveness and prominence of new technologies (Choi et al., 2023b).

7 IMPLICATIONS AND A CONCLUSION

This work has significant ramifications for the application of AI in education, especially the benefit of deploying an LLM-powered chatbots as a multipurpose tool. First off, this study is one of the first attempts to scientifically investigate ChatGPT's educational value. This research discovered that the chat- bot performs several educational tasks, such those of interlocutor, content provider, teaching assistant, and evaluator, building on theoretical studies with empirical data. Second, this study included specific illustrations of instructor prompts that were utilized to generate practical replies. This discovery may be used by instructors, instructors, and researchers to launch additional investigation into the possibilities of LLM-powered chatbots and to create various application strategies depending on their educational goals. Finally, our study demonstrates the necessity for teacher training programs that are especially tailored to use with an LLM-powered chatbot, supporting the notion that instructing with AI requires certain teacher competencies (e.g., Celik, 2023; Kim et al., 2023a). The instructors in this study concluded that after using ChatGPT for a two-week period, getting excellent outputs from the chatbot depended on the teacher's capacity to create quality questions. Another significant challenge in this respect would be the requirement for beginning training and continuing education programs to assist instructors in matching the assets rendered available by technology with their educational objectives (Jeon et al., 2022) [11].

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