MSc Computer Science & Big Data Analytics

ChatGPT: The advancement of knowledge and incorporation for its users. - Literature review

06/07/2023

Word Count – 1414

# Literature Review

## Background and Aims

ChatGPT – is a large language Model (LLM) Artificial Intelligence (AI) tool created by Open AI which answers requests via Natural Language Processing (NLP) tasks [1], applicable in various practices. However, does ChatGPT allow for further education or knowledge enhancement for its users? Therefore, this chapter aims to examine currently available research and literature – or lack thereof - on whether users get to enhance knowledge further in that area from their perspective, and if so, is ChatGPT then incorporated into their day-to-day activities. The proceeding sections intend to highlight the literature reviewed and break out into separate themes uncovered.

## Research found upon ChatGPT Evaluation and its uses.

A study seen from Surameery and Shakor [4], examines ChatGPT use in solving programming bugs, understanding if the tool aids in debugging assistance, explanation, and corrections for software development practices. Additionally, a comparison conducted between ChatGPT and Integrated Development Environments (IDE’s) testing effectiveness between practices. This study is extended further from works by Sobania et al [5] and Bang et al [6]. The study – in silo – provides some context about how ChatGPT can be used and against other tools but provide no specific examples as to what bugs were explored and how they were solved. Additionally, there was no research conducted on software developers using ChatGPT to solve any programming problems nor a perception of how this has helped them.

With Sobania et al [5], an evaluation performed back in January 2023 against ChatGPT on responses regarding if a piece of code has a bug and how it should be fixed; concluding a mostly positive but mixed results on performance – particularly where verification is needed, but better responses compared with other tools once context is applied on either side of the query. This study extends research from Surameery and Shakor [4], showing detailed examples of prompts used and responses from ChatGPT stating “would yield ChatGPT to be a viable tool that would help software developers in their daily tasks”. This excerpt from the research was not the focus and more a foundation that can be built upon, where the research proposed helps at least partially address the gap the above research presents.

Additionally, Bang et al [6] evaluates ChatGPT against a series of public datasets covering different tasks, and how it compares with other LLM’s – stating a good performance, but not without the risk of external hallucination – where a confident response is received without any justification from its training.

An article by Su, Lin, and Lai [29] suggests using ChatGPT to support students' argumentative writing in classrooms. The authors propose that ChatGPT can help students formulate clear and logical claims supported by evidence to persuade others. They conducted experiments with ChatGPT using various prompts to measure its feedback performance. Additionally, they recommend that teachers instruct students to create their own outlines before seeking feedback and inspiration from ChatGPT for future learning. While this paper showcases the potential benefits of using ChatGPT in the classroom, it lacks an experimental exploration of student control and test groups to evaluate the impact on argumentative writing performance. Furthermore, the perspectives of both teachers and students regarding the use of ChatGPT in this context remain unexplored, presenting an opportunity for further investigation.

Based on all studies presented above, all bare similar themes testing ChatGPT and its application with evaluation against different metrics, other LLM’s or other tools. More importantly, a gap is seen throughout the literature so far in that, whilst ChatGPT has been tested on performance and use in silo for a particular use or topic, no views from an array of users have been collected to understand whether users have used or adopted its practice on the scenarios presented above, giving space for this proposed research to explore this gap.

## Research on ChatGPT and the enhancement of user knowledge and incorporation

Aljanabi [7] extends the notion of using ChatGPT, enabling possibilities and future directions for users and the software itself. This paper provides a great introduction into the use of ChatGPT and opportunities it presents, such as a potential for user personalisation, and alluding to integration for different working fields, enhancing lives in meaningful ways. However, as Aljanabi [7] frames this work as an introductory piece into the subject, no specific examples are tested either in a standalone study or across a sample of participants assessing claims made here are proven.

Similarly, an excerpt from Liberman [8] suggests ChatGPT as a tool to explore sources of information for users, focusing on students as a primary user, assisting with understanding context of a subject. Although, Liberman does go further to say that ChatGPT may not provide accurate information in all areas for its user. Again, this source does provide a highlight on what ChatGPT is and how it can be used to assist with context, but little information of how it provides knowledge enhancement and detail is lacking to explain this further, which is understood considering the context of the source.

Whilst sources above provide more of an introduction into ChatGPT as a field to explore rather than how users perceive the use of ChatGPT, the next set of sources delve further, albeit with limited range. A study produced by Kung et al [8] explored performance of ChatGPT on the United States Medical Licensing Exam (USMLE). Although the research’s primary focus was testing ChatGPT performance against the exam, a discussion was made on results on whether ChatGPT can assist knowledge enhancement for users taking the exam by providing insight into areas that needs development. However, limitations of this research keep it focused on ChatGPT and its output from USMLE, other than alluding exploration into knowledge enhancement for medical students taking the exam and further incorporation into day-to-day use. Therefore, a gap in the study is represented by no medical student participation shown against this study to explore the improvement of scoring in the USMLE.

A separate study found from Yue et al [9] explores the use of ChatGPT in providing financial knowledge to non-financial users, testing queries on how it can explain financial terms and metrics such as alpha, beta, earnings to price (EP) or Illiquidity to a user based on different context and publication approaches. This study is beneficial in that ChatGPT has the potential to help individuals gain financial knowledge to assist in making informed decisions. However, there is no evidence of testing these exercises against participants to test the claims made, on whether information provided is understood and helpful as well as adds to their day-to-day routine expanding knowledge further.

To summarise above, some evidence is found to exploring the notion of ChatGPT against users for knowledge enhancement, and a good introduction into possibilities that could be held here, although there seems to be a gap in measuring user engagement of the tool, instead focusing into more of what the tool can do.

## Research on ChatGPT with user perception

One piece of research, which looks to understand the use of ChatGPT from a user perspective, which is conducted by Tlili et al [10] via case study on the use of ChatGPT, and its perception from educational users, including initial user interactions and experiences. A series of analyses were conducted including Twitter network and sentiment analysis on tweets relating to ChatGPT. Additionally, interviews were conducted on participants, quoting that ChatGPT could be used as a learning aid, or for idea generation.

The study found above, whilst not much other research is available showing user perceptions on ChatGPT, it provides a great foundation to build upon. There are limitations with this research however, such as a small group of participants involved in the study, a focus within education rather than a broader perspective, and qualitative, not quantitative research done, therefore whilst themes are generated, no way to measure user’s perspective.

## Conclusion

The purpose of this chapter evaluates current research available on participants who have used ChatGPT, and whether it has enhanced their knowledge either generally or within a specific realm, or if so, does ChatGPT become incorporated into day-to-day activities. It appears though this review, that use of ChatGPT is still novel, since its release from Open AI in November 2022 [2]; and whilst at least one paper has made some progress in this area, the belief is that their gaps within research are prominent on accommodation of participants and understanding their interactions rather than separate stand-alone studies of the research or topic alone.