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GPTEACHER: EXAMINING THE EFFICACY OF CHATGPT AS A TOOL FOR PUBLIC HEALTH EDUCATION

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Abstract:
The language used in healthcare to describe diseases, medical procedures, and treatments is identified as medical terminology. Learning medical terminology can be problematic owing to its complexity and volume. Generative Pre-trained Transformer (ChatGPT) is an artificial intelligence (AI) language model that can simulate human conversations while providing individualized feedback, making it potentially a viable tool for learning medical terminology. The purpose of this study is to look at the benefits of using ChatGPT to learn medical terminology. A ChatGPT-based group studied medical terminology using the ChatGPT platform, while a traditional study group heard lectures and read textbooks. Following the study sessions, both groups carried out a test to evaluate their understanding and comprehension of medical terms. The study showed that the ChatGPT-based platform was more effective than traditional teaching techniques in increasing students' knowledge and understanding of medical terminology. When compared to the traditional instruction group, the group using the ChatGPT platform demonstrated significant improvements in their test results. ChatGPT offers the opportunity to improve medical terminology learning by providing students with interactive and individualized feedback. The outcomes of this study can assist with the development of novel and successful teaching techniques incorporating artificial intelligence into education.

Keywords: artificial intelligence, ChatGPT, medical terminology, public health education

1. Introduction

Effective communication is crucial in the medical field for ensuring outstanding healthcare delivery, promoting patient safety, and enhancing overall patient experiences. Medical terminology, which serves as the foundation for a worldwide language in medicine, is at the core of this communication (Dahm, 2011). Medical language enables

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precise and easy communication among healthcare providers, allowing for correct patient diagnosis, treatment, and documentation (McAllister et al., 2023). Nevertheless, due to its fundamental complexities and the huge number of specialized terms, comprehending medical language can be a daunting task. Medical students and professionals may have problems with acquiring and recalling medical phrases, which might hinder their ability to communicate effectively inside the healthcare system.

Developments in artificial intelligence and machine learning have provided new opportunities for education and training in recent months. ChatGPT, a machine learning language model developed by OpenAI, is a prime example. ChatGPT has demonstrated that it is an effective approach for acquiring challenging knowledge areas by modeling human interactions and providing personalised feedback.

The aim of this study is to investigate the effectiveness of using ChatGPT as an instrument to teach medical terminology to public health students. This project proposes solving the problems associated with the detail and volume of medical language by exploiting ChatGPT's machine learning capabilities. It also aims to find out how integrating ChatGPT into public health education can enhance the learning, retention, and application of medical terminology knowledge, therefore increasing communication skills among public health students.

This study focuses on updating of current knowledge on novel methods of education in healthcare through investigating the impact of ChatGPT on acquiring medical terminology. The results of this study could assist in directing the creation of efficient and effective techniques for medical terminology training, which would assist both students and public health professionals. Lastly, educational, and instructional developments have the potential to boost patient care, safety, and overall healthcare satisfaction.

2. Literature Review

2.1. Artificial Intelligence (AI)

AI is the capacity of an automated system to execute mental operations that we normally identify with human brains. The history of artificial intelligence dates to the mid-20th century when researchers began exploring the concept of artificial intelligence. The 1956 Dartmouth Conference was a landmark event, bringing together influential figures such as John McCarthy and Marvin Minsky, who coined the term "artificial intelligence" and laid the foundations for future AI research. (Sheikh et al., 2023).

A notable milestone in the history of AI was the 2011 victory of IBM's Watson supercomputer over humans in the game show Jeopardy. AI has also made significant contributions to natural language processing (NLP). In 2017, the introduction of transformers such as the Transformer model and its variant Bidirectional Encoder Representations from Transformers (BERT) led to significant improvements in language understanding and the development of advanced chatbot systems (Ferruz & Höcker, 2022).

As AI evolves, ethical considerations and its impact on society are becoming increasingly important. Issues such as AI algorithm bias, privacy concerns, and the potential impact of AI on jobs and the economy are being actively addressed to ensure responsible and beneficial use of AI technology.

The most advanced AI methods require huge amounts of computing resources, which increasingly only the richest companies can afford. This gives technological giants enormous influence not only in terms of shaping the research field, but also in developing and controlling the algorithms that govern our lives. (Rudolph et al., 2023).

2.2. ChatGPT

OpenAI released the big language model ChatGPT, a version of GPT-3, on November 30th, 2022. Following questions from the user, the AI chatbot responds in real-time. ChatGPT is remarkable because it combines advanced AI with a user-friendly interface, distinguishing it from previous AI systems, assistants, and chatbots. ChatGPT-3 is a product of OpenAI, an artificial intelligence research lab founded in 2015. The development of ChatGPT-3 is part of OpenAI's ongoing effort to improve natural language processing and create more sophisticated AI systems. The path to ChatGPT-3 began with previous versions of the model, such as GPT-1 and GPT-2. GPT-1, released in 2018, introduced the concept of using deep learning techniques, particularly transformers, for speech generation tasks (Zhang et al., 2023). It demonstrated the ability to produce coherent and contextually relevant text but had limitations regarding long-term coherence and consistency. On November 30th, 2022, the launching of this ubiquitous interactive chatbot is predicted to have a substantial and broad impact on the academic world. Integrating this innovation into higher education may have several advantages, including increased involvement, cooperation, and better access for students. ChatGPT has received an enormous amount of interest in the past few months because of the outstanding quality of its language model. (Rudolph et al., 2023)

Haque et al. (2022) examined Twitter data in a mixed-methods study to investigate the concepts, viewpoints, and feelings of early ChatGPT users. Their results showed that the two largest populations of ChatGPT users in the initial period were students and researchers. Additionally, Qadir (2023) utilized ChatGPT to conduct experiments and tests to investigate potential advantages and challenges for higher education. He observed and established suggestions for plagiarism detection, the importance of differentiating between proper and inappropriate tool use, and the potential for using ChatGPT in teaching.

Zhai (2022) completed research utilizing ChatGPT to create an academic paper on a specific subject in his experience report. He noticed that ChatGPT's performance was exceptional and had a big impact on the entire writing process. This obviously raises an issue regarding the way this tool may be used in university education. Zhai (2022) provides numerous proposals in these areas. For example, he suggests that teachers rethink and alter their examination methods, and that, if necessary, the use of ChatGPT could assist the development of extra abilities in scientific literature and research (Zhai, 2022).

An understanding of medical terminology is crucial for students specializing in the health sciences (medicine, dentistry, pharmacy, and applied medical sciences) (Al-Jarf, 2010). The ability to understand and use medical terminology effectively is critical for public health professionals when communicating with patients, colleagues, and stakeholders. Effective learning of medical terminology in public health education involves the use of a variety of teaching methods such as lectures, group discussions, and hands-on exercises. Students also become familiar with medical terminology used in a variety of healthcare settings, including hospitals, clinics, and community health centers. By mastering medical terminology, public health professionals can communicate effectively with their colleagues and patients, reducing the likelihood of errors, misunderstandings, and misinterpretations. Nevertheless, for some students who find it excessively difficult or challenging, mastering this terminology might be an important obstacle to their progress. Understanding, remembering, and using essential medical terms in clinical and professional settings is essential for success whether a student is interested in medical writing, recording, clinical tasks, or healthcare administration.

The aim of this study was to:

- evaluate the effectiveness of a ChatGPT in improving students' knowledge and understanding of medical terminology.
- compare the effectiveness of ChatGPT with traditional teaching methods.

The research question guiding the implementation of this study is:

- What is the effectiveness of utilizing ChatGPT as a medical terminology learning tool for Public Health students?

3. Material and Methods

3.1. Research Design

The purpose of this study was to investigate the effectiveness of ChatGPT in learning medical terminology. Students (n=200, 94 males and 106 females, mean age=26.9±2.8) were randomly assigned to one of two groups: a ChatGPT platform-based group (n=100, mean age=26.7±2.7) or a traditional learning group (n=100, mean age=27.1±2.9). The ChatGPT-based group used the ChatGPT to learn medical terminology, while the traditional learning group listened to lectures and read textbooks. Both groups took a multiple-choice quiz with 100 questions on the material covered to assess their knowledge and understanding of medical terminology. The same test was also administered by ChatGPT, and the answers obtained were compared with those of the other group of students. A questionnaire approach was also used to assess students' experience with ChatGPT. The questionnaire was designed to obtain information and feedback on student interactions and perceptions of their use of the ChatGPT system. The questionnaire consisted of a combination of closed and open-ended questions to collect both quantitative and qualitative data. Closed questions included rating scales or multiple-choice options to assess various aspects of the experience, such as perceived usefulness, ease of use, and overall satisfaction with ChatGPT. These questions provided

a structured framework for collecting quantitative data and allowed for statistical analysis and comparison between different response categories.

ChatGPT's ability to produce creative ideas was assessed by the item "Was ChatGPT able to generate creative ideas or suggestions?"

The impact of ChatGPT on the learning experience was assessed by the item "How would you rate the impact of ChatGPT on your learning experience?"

Data were analyzed using descriptive statistics, including number, percentage, and mean (IBM SPSS 26-for Mac).

3.2. Hypothesis

The study hypothesized that implementing ChatGPT is more effective than traditional teaching techniques in improving students' understanding and comprehension of medical terminology.

4. Results and Discussion

The percentage of students passing the exam following the two approaches, ChatGPT and traditional methods, was compared. The results (Figure 1) showed that the pass rate for students using ChatGPT was 86% while the pass rate for traditional methods was 72%. This study found that the ChatGPT is more effective than traditional teaching methods in improving learners' knowledge and understanding of medical terminology. Students in the ChatGPT-based platform group showed a significant improvement in their test scores compared to the traditional teaching group.

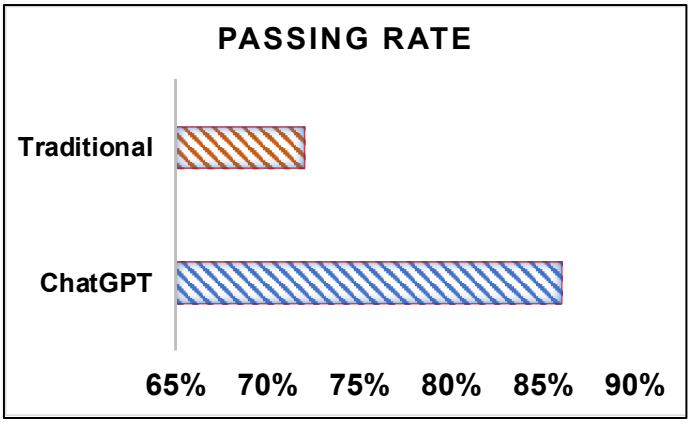

Figure 1: Passing rate of students ($p<0.05$).

The survey results show that 89% of respondents believe that ChatGPT can generate creative ideas or suggestions, and only 11% indicated that it is not capable of doing so (Figure 2).

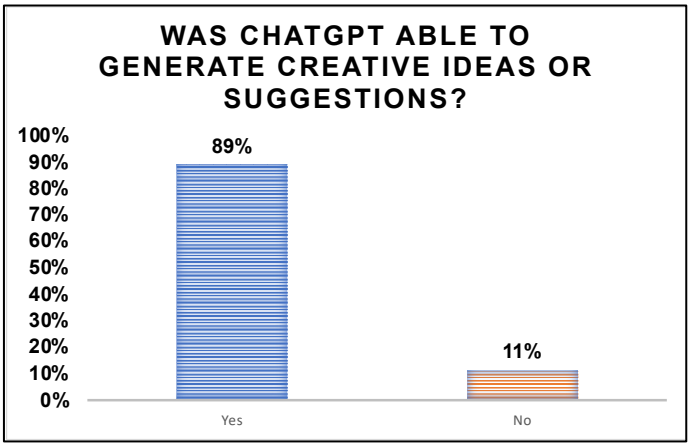

Figure 2: ChatGPT's ability to generate creative ideas

As shown in Figure 3, when respondents were asked to rate the impact of ChatGPT on their learning experience, responses were distributed as follows: 66% reported a somewhat positive impact, 11% reported a very positive impact, 15% reported no impact, 8% reported a somewhat negative impact, and no respondent reported a very negative impact (Figure 3).

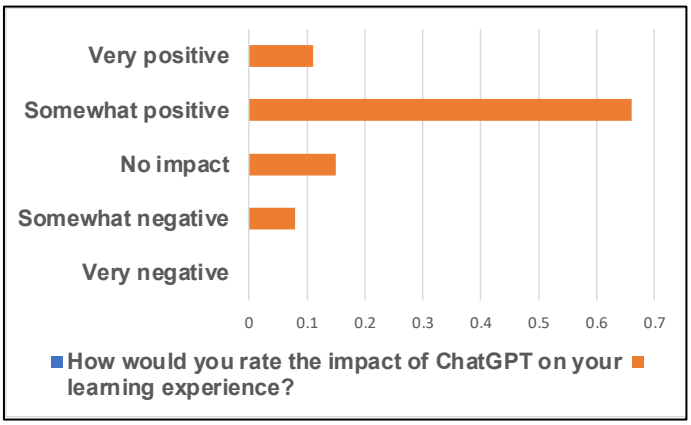

Figure 3: Impact of ChatGPT on learning experience

When asked if they would recommend the use of ChatGPT to other students, 92% of respondents answered "Yes" and 8% answered "No" (Figure 4).

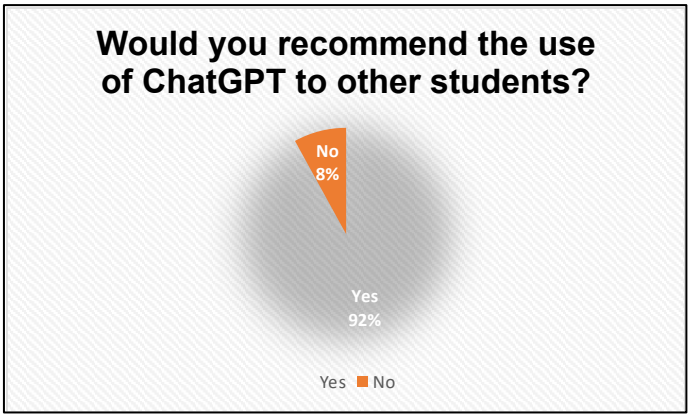

Figure 4: Recommendation of ChatGPT to other students

5. Conclusion

ChatGPT has the potential to enhance medical terminology learning by providing interactive and personalized feedback to learners. The findings of this study contribute to the development of innovative and effective teaching approaches that integrate artificial intelligence in education.

The higher pass rate observed with ChatGPT suggests that the use of this artificial intelligence system had a positive impact on student performance. The interactive nature of ChatGPT, combined with its ability to provide individualized feedback and assistance, likely contributed to higher levels of student success. The continued availability of ChatGPT and the ability to respond immediately may have contributed to a better understanding and memorization of the material by students. Students were able to work with ChatGPT at their own pace and received immediate explanations and explanations, which improved their learning experience and ultimately increased their pass rate.

ChatGPT's creative power comes from its underlying architecture and training methodology. The model is trained on a large variety of textual data, allowing it to generate a broad knowledge base and recognize patterns that can be combined in unique and fancy ways. The use of advanced language models, such as transformers, enhances the system's ability to generate coherent and contextualized sentences. ChatGPT's creative suggestions can serve as a source of inspiration for individuals, helping them overcome their thought blocks and develop their own creativity. By showing alternative points of view or offering out-of-the-box ideas, ChatGPT can encourage users to think outside the box and explore new possibilities.

The survey results indicate that a significant proportion of respondents perceived the learning experience with ChatGPT as positive. These results highlight the potential of AI-powered systems to improve the educational process and provide individualized support to learners. However, to maximize the benefits of integrating ChatGPT into the learning environment, individual needs and preferences must be carefully considered.

Most respondents (92%) recommended the use of ChatGPT to their fellow students. This high percentage of recommendations indicates that students find the AI system valuable and useful in their learning process, which highlights its potential as a supportive tool in an educational environment. Their positive recommendation of ChatGPT can be explained by several factors. First, the system's ability to provide personalized help and immediate feedback likely contributed to its value. Students appreciated the need-based access to information, personalized explanations, and the ability to clarify doubts whenever they wanted. Second, the interactive nature of ChatGPT and the ability to have a conversation may have enhanced the students' learning experience. The system's ability to engage in dialogue, simulate conversation, and adapt to individual learning needs may have contributed to users' positive perception of the system.

It is important to note that while pass rates were higher when using ChatGPT, further analysis and research is needed to examine possible factors contributing to this outcome. Factors such as length of time using ChatGPT, level of student engagement,

and quality of instructional content should be considered in future studies to gain a full understanding of the observed differences in achievement.

Limitations

The proposed study has multiple limitations. The first limitation is the small sample size, which could not represent the population as a whole or provide statistical power. With such a small sample size, results may lack generalizability and could be subject to sampling biases. Another important limitation is a focus on data collected by one specific university. Students' characteristics, demographics, and educational experiences at one university may differ significantly from those at other institutions, limiting the findings' broader relevance and generalizability.

Ethics Approval

The Chicago State University (CSU) Human Research Ethics Committee approved the study (Protocol 002-01-21). Informed consent was obtained from all participants in this study.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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