Interactive Learning Mode of Sports Anatomy Course Based on ChatGPT: Practice

Katherine Ning LI

Institute of Sports Science, Xi'an Physical Education University, China

Abstract: The paper aims to explore the interactive learning mode of sports anatomy based on ChatGPT. The paper first reviews the application of ChatGPT in the field of education, the current situation, and the challenges of sports anatomy teaching. It also introduces other AI-based interactive learning methods. The Method and Design section will detail the configuration of the selected ChatGPT model and the data collection and processing process, as well as the design and implementation of the interactive learning system. The results section summarizes the effects of ChatGPT on interactive learning in sports anatomy, including student feedback and subjective evaluations, and explains and discusses the results in detail. Through this research, we hope to provide a novel interactive learning mode for sports anatomy teaching and promote students' learning and understanding.

Keywords: Sports anatomy, Interactive learning, ChatGPT, Educational applications

I. INTRODUCTION

With the development of artificial intelligence technology, language-based interactive learning systems have broad application prospects. Sports anatomy is the foundation of sports learning, but traditional learning methods, such as viewing diagrams and taking notes, could be more efficient and achieve interactive and personalized teaching.

In recent years, the large language model ChatGPT developed by OpenAI has shown robust language understanding and generation capabilities. ChatGPT can interact in natural language and respond according to different user needs. Applying ChatGPT to interactive learning systems can achieve better-personalized teaching[1][2].

Therefore, researching an interactive learning system for sports anatomy based on ChatGPT has essential theoretical and practical significance[3]. This system can break time and space restrictions, achieve personalized online interactive teaching, and collect learner's questions to continuously optimize the knowledge graph, making the system more intelligent. The topic selected for this study has essential background significance and application prospects.

II. RESEARCH OBJECTIVES

1. Research Objectives:

Build a knowledge graph of sports anatomy and collect and integrate relevant knowledge. Design an interactive learning model based on ChatGPT to achieve personalized teaching. Develop an interactive learning system for sports anatomy to optimize user experience. Collect user questions to create a feedback mechanism and continuously improve the knowledge graph. Verify the system's interactivity, intelligence, and effectiveness through empirical analysis.

This research aims to improve the learning efficiency of sports anatomy, achieve personalized, intelligent teaching, and provide new ideas for sports anatomy teaching.

2. Research Significance:

This human-computer interaction model enriches and expands interactive learning applications based on language models, providing new ideas for online autonomous learning of

sports anatomy. It provides a reference for building a knowledge graph of sports anatomy, helping to integrate knowledge in this field. It provides experience for designing personalized interactive learning systems, promoting innovation in teaching and learning modes. It provides ideas for continuously improving the knowledge graph and enhancing system intelligence, contributing to building upgradeable intelligent learning systems. The research results can be applied to interactive teaching in other professional fields. In the long term, it can assist in building intelligent teaching systems covering knowledge in various fields.

III. RESEARCH CONTENT

1. ChatGPT and Its Application in the Education Field

ChatGPT is an intelligent chatbot based on large-scale language models launched by OpenAI in 2022. Trained using deep learning and other technologies, it can understand and respond in natural language[4].

The features of ChatGPT include robust language understanding and generation capabilities, enabling human-machine natural language interaction. It can generate personalized responses based on different needs. With the GPT model as the foundation, which has billions of parameters, ChatGPT has vast knowledge and broad coverage. Its characteristics include high reply consistency and semantic coherence in multi-turn interactions. Continuously optimizing the model through machine learning enhances interaction effectiveness.

The application value of ChatGPT in education includes serving as a personalized interactive teaching assistant to improve learning efficiency. It can autonomously generate teaching resources to alleviate teachers' workload. By engaging in multi-turn interactions with learners, it can identify knowledge gaps. ChatGPT can be used for automated homework corrections, writing feedback, assisting teachers in exam question generation, student assessment, and more. The robust language capabilities of ChatGPT provide new possibilities for education, and its application in interactive learning can achieve better teaching and learning effects[5][6[7]].

2. Current Status and Challenges of Sports Anatomy Teaching

Sports anatomy is an essential foundational course in sports disciplines, where traditional teaching methods rely mainly on teachers imparting theoretical knowledge face-to-face and students memorizing and understanding the structure

and function of the human body's bones and muscles. However, this teaching approach needs more efficiency. Specifically, 1) the abstract nature of the learning content makes understanding and application skills weak with reliance on viewing diagrams and taking notes; 2) the teaching methods are singular and cannot cater to different needs; 3) assessments focus on memory retention rather than evaluating application skills. Additionally, the limited availability of online self-learning resources inhibits breaking time and space restrictions. These problems lead to low interest in learning and weak knowledge application skills. Therefore, there is a need to expand teaching methods, build interactive online learning platforms, achieve personalized teaching, and enhance learning effectiveness[8]. Technologies like ChatGPT provide the potential for this. However, challenges in knowledge graph construction, interactive mode design, and system development necessitate further research.

3. Methods and Design

1) Selection and Configuration of ChatGPT Model

This research considers selecting the Davinci model as it is the largest in parameters and richest in training data within ChatGPT[8], showing outstanding performance. Specific configurations may involve choosing a fine-tuned version of Davinci, which involves additional fine-tuning with text relevant to the field on top of general pre-training to enhance the user experience. The study can collect literature, textbooks, and Q&A data related to sports anatomy to build a fine-tuning dataset, boosting the model's adaptability in the field through transfer learning. Different parameter scales can also be experimented with to optimize the model's configuration and effectiveness. Furthermore, considering sports anatomy involves rich visual information, combining visual models can enhance ChatGPT's understanding of images, better serving interactive teaching in the field.

2) Data Collection and Processing

Structured medical text data, such as medical records and examination reports, can be collected from public medical databases. Using web scraping techniques, unstructured texts can be sourced from medical papers, textbooks, and online Q&A sites. Establishing a medical dialogue corpus with authentic patient dialogues can also be considered. Data preprocessing involves cleaning irrelevant content to maintain data quality, annotating structured data to extract critical information, and conducting language processing tasks such as word segmentation and sentence parsing for unstructured texts. Anonymization eliminates sensitive privacy information, while the creation of rehabilitation medical vocabularies and

Page 54

symptom lexicons aids standardization. Data annotation based on the interactive mode design, such as replies and questions, can be employed, utilizing transfer learning for data augmentation. Collecting and meticulously preprocessing a vast amount of multi-source medical data can build high-quality medical knowledge graphs and Q&A datasets to support model training. However, data privacy and medical ethics should be carefully considered and protected.

4. Design and Implementation of Interactive Learning Systems

1) Design user-friendly interfaces focused on interaction, supporting text, speech, or image inputs for multimodal interaction. Provide personalized recommendations and path adjustments.

2) Construct a knowledge graph comprising concept entities, attributes, relationships, etc., utilizing knowledge representation techniques to formalize knowledge.

3) Use natural language processing technologies to understand user inputs and extract intent and critical information.

4) Select suitable dialogue management modules to control interaction flows, calling on backend knowledge bases for question-answer generation.

5) Implement a multi-turn dialogue memory function to ensure coherent interaction, generating replies utilizing a combination of retrieval and generation.

6) Apply reinforcement learning methods to optimize strategies based on user feedback continually. Consider fault tolerance and security mechanisms to handle exceptional cases. Establish cloud servers and databases for system network deployment.

7) Conduct functionality testing, performance evaluations, user surveys, and iterate for optimization. An intelligent, friendly, and highly adaptive interactive learning system can be realized by applying knowledge engineering, natural language processing, and human-computer interaction technologies.

IV. RESEARCH RESULTS AND DISCUSSION

1. The Effectiveness of ChatGPT in Interactive Sports Anatomy Learning

ChatGPT offers significant potential for personalized,

interactive learning in sports anatomy[9]. ChatGPT can explain to students in simple language based on their questions as a virtual teaching assistant, making complex professional knowledge more accessible. Students can pose various sports anatomy-related questions to ChatGPT through speech or text, receiving personalized one-on-one interactive teaching. ChatGPT can quickly generate a large amount of sports anatomy Q&A for students, aiding in memory recall and retrieval-based learning. Furthermore, ChatGPT can assist in generating noun explanations, critical analyses, mind maps, and other teaching resources related to sports anatomy to enrich teaching methods. ChatGPT can continuously summarize student interaction needs through machine learning, optimize responses, and achieve adaptive teaching. While ChatGPT's image understanding capability is limited, supplementing with other visual AIs can enhance interactive image recognition in sports anatomy. ChatGPT can help construct a personalized autonomous learning platform for sports anatomy, enabling on-demand learning and repeated practice. Emerging technologies like VR/AR and ChatGPT-driven interactive teaching can provide an immersive learning experience[10].

2. Student Feedback and Subjective Evaluation can be summarized as follows:

Students note the system's novel and engaging interaction methods, which enhance learning interest. They can pose questions in their voice or text, receiving friendly responses akin to interacting with a teacher. The multi-turn interactions offer comprehensive answers, detailed explanations, and significant learning assistance. Personalized question responses make the once dreary knowledge enjoyable and easier to understand, with enhanced knowledge absorption. Students no longer confine their learning content to textbooks and teachers, acquiring a broader knowledge base. Students can progress at their own pace and follow their interests for autonomous learning, breaking free from uniform progress schedules. AI systems help spark learning interest, making learning more active than passively receiving knowledge. Through system usage, application abilities in anatomy are enhanced, and the system assists in course exams.

Overall, students provide positive evaluations and feedback for the learning system. While certain roboticness exists in interactions and language expression can be improved, continuous optimization is needed.

V. CONCLUSION AND PROSPECTS

ChatGPT can be applied to teaching school sports anatomy and enhancing learning efficiency by providing

personalized online interactive learning for athletes and enthusiasts. The system's reusability extends to interactive teaching in other disciplines, imparting experiences for industrialized intelligent education systems and promoting education digitization.

Beyond ChatGPT-based methods, several other AI technologies can be applied to interactive learning. For example, intelligent teaching systems based on cognitive computing analyze student learning behavior to offer personalized recommendations. Methods utilizing knowledge graphs and natural language processing automatically address student questions. Multimodal technologies integrate speech, images, videos, etc., to enhance interaction experiences. Machine learning algorithms predict student learning outcomes to adjust teaching strategies dynamically. Visualization and simulation technologies can simulate experiments and scenarios to heighten learning interest. In conclusion, artificial intelligence provides technological support for adaptive, personalized, and immersive interactive learning. As new technologies like 5G and VR/AR flourish, interactive learning will evolve toward intelligence and personalization.

REFERENCES

[1] Ni, Z., Peng, R., Zheng, X., & Xie, P. (2024). Embracing the future: Integrating ChatGPT into China's nursing education system. *International journal of nursing sciences,* 11(2), 295–299. https://doi.org/10.1016/j.ijnss.2024.03.006

[2] Kim T. W. (2023). Application of artificial intelligence chatbots, including ChatGPT, in education, scholarly work, programming, and content generation and its prospects: a narrative review. *Journal of educational evaluation for health professions*, 20, 38. https://doi.org/10.3352/jeehp.2023.20.38

[3] Ni, Z., Peng, R., Zheng, X., & Xie, P. (2024). Embracing the future: Integrating ChatGPT into China's nursing education system. *International journal of nursing sciences*, 11(2), 295–299. https://doi.org/10.1016/j.ijnss.2024.03.006

[4] Holderried, F., Stegemann-Philipps, C., Herschbach, L., Moldt, J. A., Nevins, A., Griewatz, J., Holderried, M., Herrmann-Werner, A., Festl-Wietek, T., & Mahling, M. (2024). A Generative Pretrained Transformer (GPT)-Powered Chatbot as a Simulated Patient to Practice History Taking: Prospective, Mixed Methods Study. *JMIR medical education,* 10, e53961. https://doi.org/10.2196/53961

[5] Ittarat, M., Cheungpasitporn, W., & Chansangpetch, S. (2023). Personalized Care in Eye Health: Exploring Opportunities, Challenges, and the Road Ahead for Chatbots. *Journal of personalized medicine,* 13(12), 1679. https://doi.org/ 10.3390/jpm 13121679

[6] Manolitsis, I., Feretzakis, G., Tzelves, L., Kalles, D., Katsimperis, S., Angelopoulos, P., Anastasiou, A., Koutsouris, D., Kosmidis, T., Verykios, V. S., Skolarikos, A., & Varkarakis, I. (2023). Training ChatGPT Models in Assisting Urologists in Daily Practice. *Studies in health technology and informatics,* 305, 576–579. https://doi.org/ 10.3233/SHTI230562

[7] Yang, J., Por, L. Y., Leong, M. C., & Ku, C. S. (2023). The Potential of ChatGPT in Assisting Children with Down Syndrome. *Annals of biomedical engineering*, 51(12), 2638–2640. https://doi.org/10.1007/s10439-023-03281-3

[8] Srivastava, R., & Srivastava, S. (2023). Can Artificial Intelligence aid communication? Considering the possibilities of GPT-3 in Palliative care. *Indian journal of palliative care*, 29(4), 418–425. https://doi.org/10.25259/IJPC_155_2023

[9] Balasanjeevi, G., & Surapaneni, K. M. (2024). Comparison of ChatGPT version 3.5 & 4 for utility in respiratory medicine education using clinical case scenarios. Respiratory medicine and research, 85, 101091. *Advance online publication.* https://doi.org/10.1016/j.resmer.2024.101091

[10] Sharma, M., & Sharma, S. (2023). A holistic approach to remote patient monitoring, fueled by ChatGPT and Metaverse technology: The future of nursing education. *Nurse education today*, *131*, 105972. https:// doi.org/ 10.1016/j.nedt. 2023.105972