

DOI: <https://doi.org/10.56936/18290825-4.v18.2024-98>**USING CHATGPT TO CREATE ENGAGING PROBLEM-BASED LEARNING SCENARIOS IN ANATOMY: A STEP-BY-STEP GUIDE****KARRAR ALSHARIF M.H.^{1*}, ELAMIN A.Y.², ALMASAAD J.M.^{3,4}, BAKHIT N.M.⁵,
ALARIFI A.^{6,7}, TAHA K.M.⁸, HASSAN W.A.⁹, ZUMRAWI E.⁹**¹ Department of Basic Medical Sciences, College of Medicine, Prince Sattam Bin Abdulaziz University, Al Kharj, Saudi Arabia² Department of Histology and Embryology, Faculty of Medicine, Ondokuz Mayıs University, Samsun, Turkey³ Department of Basic Medical Sciences, College of Medicine, King Saud Bin Abdul Aziz University for Health Sciences, Jeddah, Saudi Arabia⁴ King Abdullah International Medical Research Centre, King Abdulaziz Medical City, Jeddah, Saudi Arabia⁵ Department of Anatomy, College of Medicine and Medical Sciences, Arabian Gulf University, Manama, Bahrain⁶ Department of Basic Sciences, College of Science and Health Professions, King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia⁷ King Abdullah International Medical Research Center, King Abdulaziz Medical City, Riyadh, Saudi Arabia⁸ Department of Anatomy, Faculty of Medicine, Omdurman Islamic University, Omdurman, Sudan⁹ Education Development and Research Centre, Faculty of Medicine, University of Gezira, Sudan*Received 19.12.2023; Accepted for printing 10.11.2024***ABSTRACT**

Background: Problem-based learning is widely recognized for its ability to foster active learning and critical thinking in medical education. However, creating effective problem-based learning scenarios demands a high level of expertise. Leveraging the natural language capabilities of ChatGPT, educators can now receive assistance in designing engaging anatomy problem-based learnings.

Objective: This paper aims to provide a comprehensive guide on collaborating with ChatGPT to generate ideas, develop content, and create supporting materials for anatomy problem-based learning scenarios.

Material and methods: Our methodology involved an analysis of literature on problem-based learning best practices and experimentation on content creation using ChatGPT. The outputs were refined based on valuable feedback obtained from both educators and students.

Results: This guide emphasizes crucial aspects such as defining clear learning objectives, ensuring academic rigour, and aligning the problem-based learning scenarios with the curriculum. By harnessing ChatGPT's conversational abilities, educators can collaboratively co-create problem-based learning scenarios that are engaging and effective.

Conclusion: This human-artificial intelligence collaborative approach to anatomy problem-based learning design underscores the importance of maintaining oversight over the content generated by ChatGPT. Further research is necessary to quantify the impact of ChatGPT as a supplementary resource. Purposeful integration of ChatGPT, in alignment with pedagogical goals, has the potential to enhance engagement and learning outcomes, particularly for digitally native students.

KEYWORDS: problem-based learning, anatomy education, ChatGPT, learning objectives, artificial intelligence integration.

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INTRODUCTION

Problem-based learning is an engaging educational approach that encourages students to participate in their learning journey actively. It involves tackling real-world problems or scenarios promoting critical thinking, research, and collaboration [Putranta H, Kuswanto H, 2018; Aini D et al., 2021]. In problem-based learning, students are presented with open-ended, authentic challenges that mirror the complexities they might face in their future careers, especially in fields like medicine and healthcare. It's all about asking questions, thinking deeply, working together, and finding solutions [Hung W, 2015; Mennin S, 2021]. Problem-based learning shifts the educator's role from being a source of knowledge to a guide, empowering students to be in charge of their learning. This approach is renowned for its effectiveness in developing critical thinking and problem-solving skills and preparing students for real-life situations [Sartika W et al., 2023].

Problem-based learning is undergoing a transformative shift to meet the evolving needs and expectations of present-day medical students in the 21st century [Hawamdeh M, Adamu I, 2021]. However, this includes digitally immersed Millennials and Generation Zs, who seek an interactive and technology-driven educational experience that aligns with their daily digital routines [Dede C, 2005, Selwyn N, 2012]. These learners desire active participation in learning, favouring dynamic problem-solving over traditional passive learning approaches. They also expect instant access to knowledge through interconnected platforms, reflecting the hyper-connected world they inhabit [DiLullo C, 2020; Subagja C, 2023].

This shift is happening alongside significant advancements in artificial intelligence and natural language processing [Weitz K et al., 2021]. The emergence of sophisticated artificial intelligence systems like ChatGPT has revolutionized the landscape, showcasing the ability to generate personalized and contextually adaptive learning experiences in real time [Chary M et al., 2019, Panesar K, 2020]. ChatGPT's conversational capabilities provide a natural interface for creating customized problem-based scenarios on demand, making it an invaluable partner in transforming medical education [Dolianiti F et al., 2020].

Well-designed studies that quantify the impact

of artificial intelligence-generated problem-based learning scenarios can provide noticeable evidence of improved student outcomes compared to traditional faculty-created cases. However, it is important to integrate artificial intelligence into curricula while adhering to ethical guidelines, ensuring alignment with learning objectives and upholding academic integrity. While artificial intelligence is a powerful tool, it requires faculty expertise to oversee scenario quality, relevance, and alignment with program goals. Human educators remain essential, with artificial intelligence as a complementary resource that frees up time and energy for higher-order thinking [Rathore N, Dangi M, 2021, Paek S, Kim N, 2021].

The problem-based learning, considered as a pedagogical approach, transforms students from passive recipients of information into proactive participants in their learning journey. It perfectly aligns with the profession's requirements, requiring a depth of knowledge and the skill to apply it effectively in real-world circumstances. In an era of rapid artificial intelligence and technology advancements, problem-based learning remains a mainstay, developing future healthcare professionals [Schmidt S et al., 2010, McCombs B, 2017].

This guide aims to provide best practices for integrating ChatGPT into anatomy and medical curricula, offering step-by-step recommendations from experts. It is a roadmap for applying artificial intelligence to produce engaging problem-based learning scenarios that reflect the complexity of real-life scenarios. The objectives of this guide have two main goals: to introduce the evolution of problem-based learning and its synergy with A artificial intelligence I and to empower educators to leverage these tools in enhancing teaching practices and transforming the learning experience. Through examples and insights, we aspire to enable educators to redefine medical education and enrich the learning journey for future clinicians.

MATERIAL AND METHODS

The methodology was centred on using ChatGPT to create high-quality problem-based learning scenarios in the field of medical education. It was initiated with a thorough analysis of relevant academic sources, particularly those discussing how effective problem-based learning scenarios are made in medical education. Research articles,

books, scholarly journals, and online resources that give information and guidelines for creating quality problem-based learning scenarios have been reviewed for this study.

Afterwards, in the literature review, ChatGPT's capabilities were explored, specifically its ability to understand and engage in conversations. Consideration was given to how ChatGPT could create problem-based learning scenarios that match real-world medical situations and engage students in problem-solving.

Subsequently, experimenting with different versions of problem-based learning scenarios using ChatGPT was performed. These scenarios were tested each time, and feedback was sought from educators and students who interacted with them. This feedback played a role in making the scenarios more realistic, ensuring they met the learning goals, and keeping students interested.

The methodology was considered successful when problem-based learning scenarios closely resembled real medical situations, met the established learning objectives, and made learning enjoyable for students. These scenarios applied the principles and best practices found in the literature.

This guide is positioned as a helpful resource for educators who wish to utilize ChatGPT to create engaging problem-based learning scenarios in anatomy and medical education. Practical tips and step-by-step guidance are provided to make learning more academically beneficial for medical students and educators using ChatGPT to create an engaging and effective problem-based learning scenario (Fig. 1).

This concept map visually outlines the sequential steps involved in creating and utilizing ChatGPT to develop engaging problem-based learning scenarios in anatomy education. The process includes scenario design, development, implementation, and continuous improvement, ultimately leading to engaging and effective learning experiences for students.

GUIDELINES:

Step 1: Define Learning Objectives

In Step 1 of creating a ChatGPT-enhanced problem-based learning scenario in anatomy, it is crucial to define clear and specific learning objectives. These objectives serve as the scenar-

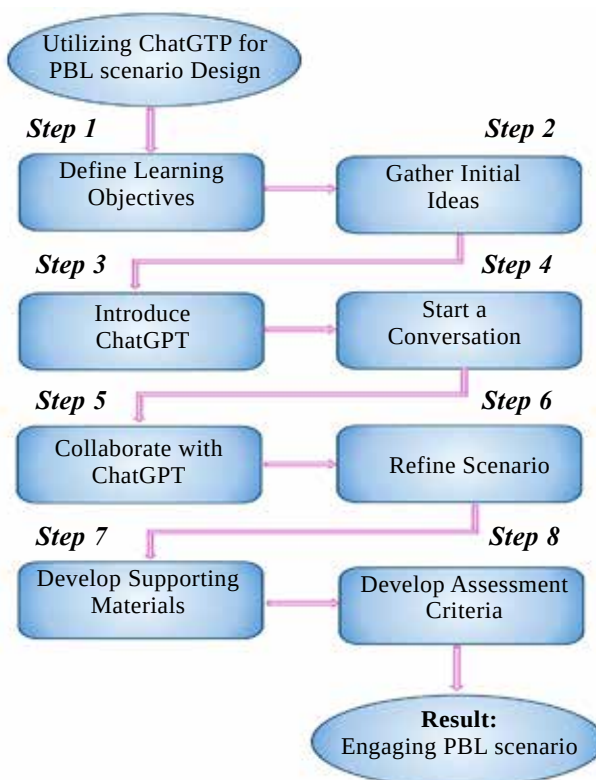


FIGURE 1. Concept Map – Creating engaging problem-based learning (PBL) scenarios using ChatGPT.

io's foundation, guiding educators and students in understanding the knowledge and skills to be acquired. The process involves identifying core anatomy concepts, selecting specific, measurable learning goals, considering the cognitive level of engagement, aligning objectives with real-world applications, defining assessment criteria, using action verbs, and prioritizing and sequencing the objectives. Collaboration with colleagues or subject matter experts helps review and refine the objectives, ensuring they are comprehensive and aligned with educational goals. These well-defined learning objectives guide the subsequent steps in creating an engaging and effective problem-based learning scenario.

Step 2: Gather Initial Ideas

During this phase, the focus should be on selecting the anatomical topic that interests you the most and identifying a practical, real-life issue or challenge you'd like to address. Here, you will be provided with some starting points for brainstorming. To begin with, consideration might be given to creating a scenario that revolves around the diagnosis and treatment of appendicitis. This scenario would reflect the intricate decision-making process that is faced by

surgeons when dealing with suspected cases of this condition. Alternatively, a scenario that involves a traumatic musculoskeletal injury could be designed, challenging students to identify the affected anatomical structures and recommend appropriate treatment, like the challenges encountered in emergency medicine and orthopaedic surgery. Another option to consider is a scenario focused on cardiovascular diseases, where a patient presenting with chest pain is diagnosed and managed by students, reflecting the complications of clinical cardiology.

Additionally, a scenario related to medical imaging and cross-sectional anatomy can be explored, allowing students to interpret imaging results to diagnose an undisclosed medical condition, resembling the role of radiologists. Furthermore, an engaging approach might be taken to create a neurological case where students are tasked with diagnosing a neurological disorder based on a patient's symptoms, reflecting the challenges faced by neurologists. For those interested in reproductive anatomy, a scenario involving high-risk pregnancies and the intricacies of the female reproductive system could be developed, mirroring the responsibilities of obstetricians. These initial concepts can form the basis for your problem-based learning scenario, allowing you to tailor it to your specific educational objectives and the needs of your learners.

Step 3: Introduce ChatGPT

Educators should be aware of ChatGPT's capabilities and select a suitable platform that offers access to this artificial intelligence tool for educational purposes, ensuring that appropriate permissions or licenses are in place. Additionally, instructors must become proficient in using ChatGPT. They should familiarize themselves with the chosen platform, developing their abilities to interact with the artificial intelligence model, formulating effective questions, and interpreting its

responses. ChatGPT should be easily integrated into the anatomy problem-based learning scenario as part of scenario integration, strategically placed where its use can help the learning process. This involves identifying specific educational objectives that ChatGPT could assist with, including helping research, clarifying complex anatomical concepts, or supporting diagnostic procedures.

Step 4: Start a Conversation

In this step, to begin a conversation with ChatGPT and seek its assistance in creating a problem-based learning scenario in anatomy, use the following prompt:

"I need assistance in creating a problem-based learning scenario in anatomy. Can you help me design a scenario that's engaging and educational for anatomy students?" (Fig. 2).

Step 5: Collaborate with ChatGPT

In this step, engage in a dynamic conversation with ChatGPT, sharing your ideas while seeking its assistance in creating content for your anatomy problem-based learning scenario. Here's how to proceed:

A. Request an Overview: Begin by asking ChatGPT to provide an overview of the chosen anatomical topic. This will serve as a foundation for your scenario. For example, you can ask, "Could you give me an overview of the cardiovascular system, the chosen anatomical topic?" (Fig. 3).

B. Seek Suggestions: Ask ChatGPT for suggestions on a realistic and engaging problem or case related to the chosen anatomy topic. For instance, you might say, "I'm looking for a captivating case related to the cardiovascular system. Could you suggest a realistic and engaging problem that anatomy students can tackle?" (Fig. 4).

C. Craft a Problem Statement: Seek ChatGPT's assistance crafting a problem statement that sets the stage for your problem-based learning scenario. You can ask, "Can you help me create a problem

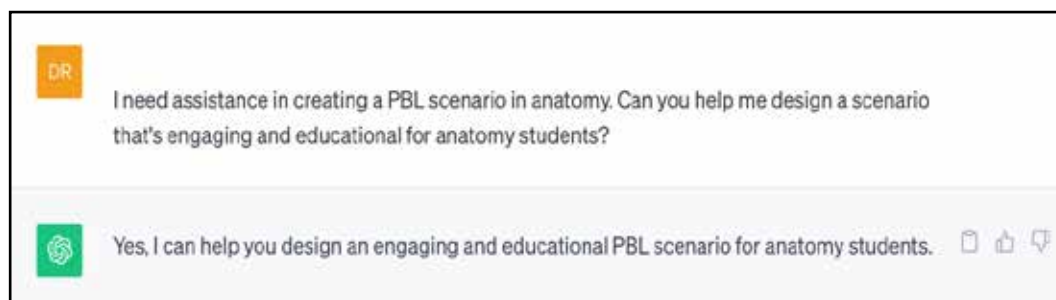


FIGURE 2. Initiating Collaborative Conversation with ChatGPT

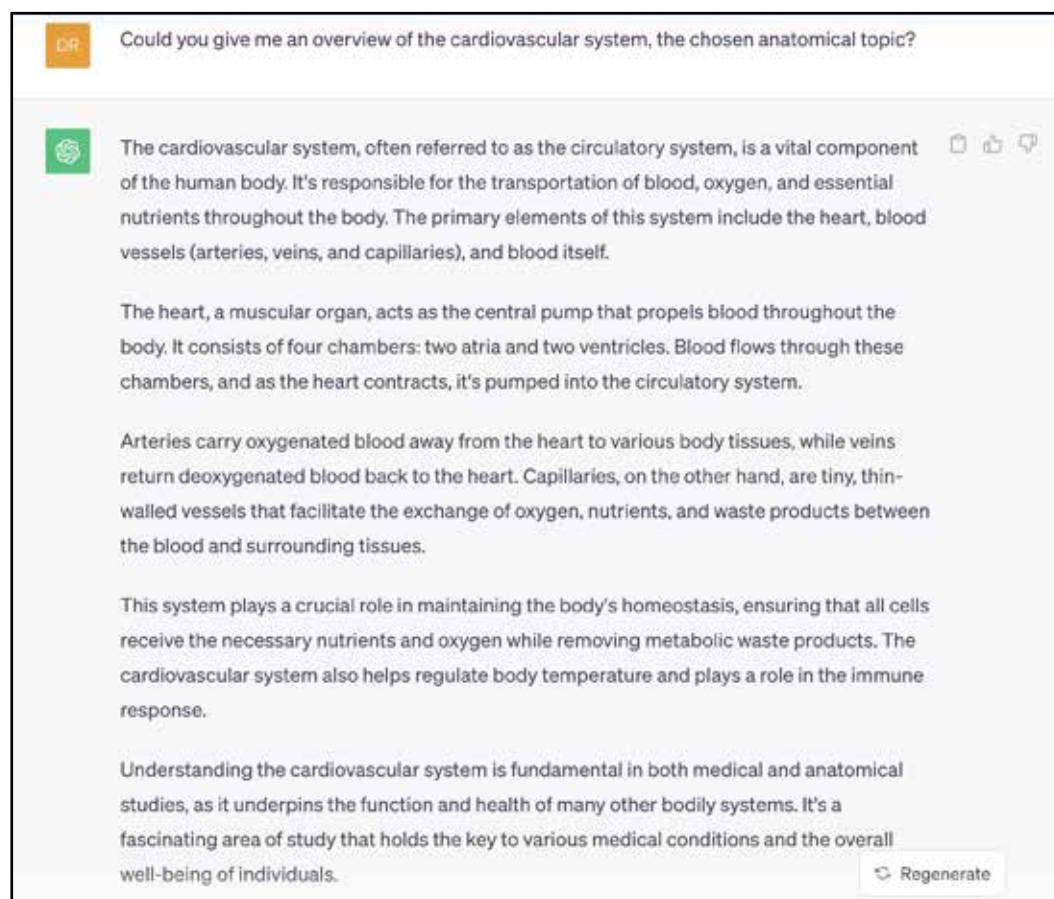


FIGURE 3. The educator requests an overview of the chosen anatomical topic from ChatGPT

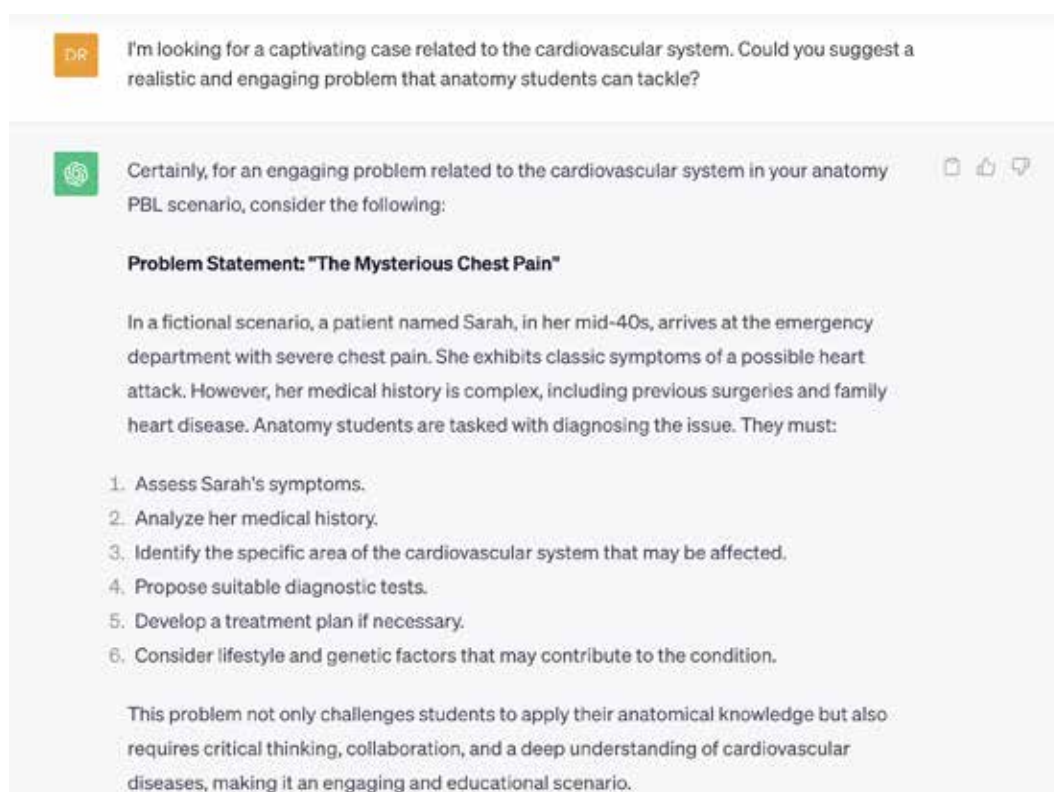


FIGURE 4. Captivating Case Query

statement that introduces the cardiovascular topic and serves as the foundation for our anatomy students' scenario?" (Fig. 5).

By engaging in this collaborative conversation with ChatGPT, you can effectively generate content for your problem-based learning scenario, making it both engaging and educational for your students.

Step 6: Refine Scenario

In this step, focus on reviewing and refining content generated by ChatGPT for your anatomy problem-based learning scenario. The main objective is to ensure alignment with your learning objectives, realism, and clarity. Key actions include verifying alignment with learning objectives, ensuring real-

ism, and maintaining clarity. This step significantly enhances the quality of your problem-based learning scenario, making it a more effective educational tool for engaging anatomy students.

Step 7: Develop Supporting Materials

In this step, focus on reviewing and creating the additional materials that will support your anatomy problem-based learning scenario. This could mean crafting patient profiles, gathering diagnostic data, or preparing reference materials. These resources are like the backstage crew that ensures your scenario shines on the educational stage. They provide students with the essential information and context to immerse themselves in the learning experience fully.



Can you help me create a problem statement that introduces the cardiovascular topic and serves as the foundation for our anatomy students' scenario?



Certainly, here's a problem statement that introduces the cardiovascular topic and lays the foundation for your anatomy students' scenario:

Problem Statement: "The Ailing Athlete"

In this scenario, your anatomy students are faced with a perplexing case. John, a dedicated athlete in his early 30s, has been experiencing alarming symptoms during his training sessions. These symptoms include severe shortness of breath, unexplained fatigue, and chest discomfort. Despite his rigorous fitness routine, he's struggling to maintain his performance levels, and his health is deteriorating.

The challenge for your students is to uncover the underlying cardiovascular issue affecting John. Their tasks include:

1. **Reviewing John's medical history:** Delve into his past health records, family medical history, and any pre-existing conditions that may provide clues.
2. **Performing a comprehensive physical examination:** Identify physical signs and symptoms that could point to a cardiovascular problem.
3. **Suggesting and interpreting diagnostic tests:** Choose appropriate cardiovascular tests, such as EKGs, stress tests, or echocardiograms, and analyze the results.
4. **Arriving at a diagnosis:** Determine the specific cardiovascular condition affecting John, considering his age, lifestyle, and the presented symptoms.
5. **Devising a treatment plan:** Propose a treatment strategy, which might involve medications, lifestyle adjustments, or even surgical intervention, with the objective of restoring John's cardiovascular health.

This problem statement engages students in applying their anatomical knowledge and promotes critical thinking, clinical reasoning, and decision-making skills—essential qualities for healthcare professionals. It forms a strong foundation for your anatomy problem-based learning scenario.

FIGURE 5. Formulating the Problem Statement

Step 8: Develop Assessment Criteria

The emphasis in this step is on creating the assessment criteria for your anatomy problem-based learning scenario. In order to accomplish this, define how the scenario's performance of the students will be assessed. These standards must align with your previously established learning objectives to provide a precise and useful way of measuring your students' growth and academic achievement. It should be noted that the ChatGPT may be used as well in this step.

DISCUSSION

This guide has outlined a systematic way to use ChatGPT's ability to have conversations to work together in creating engaging problem-based learning scenarios for anatomy education. The step-by-step suggestions provide educators with a practical framework, from setting learning goals to evaluating students, for carefully including artificial intelligence in course plans.

While promising, ChatGPT requires careful oversight to ensure academic standards are upheld. Well-designed studies measuring its impact on critical thinking and knowledge use would give powerful proof of its value as an extra resource [Zimmerman S et al., 2011; Abd Hakim N, Talib C, 2018]. This guide serves as a starting point for picturing an artificial intelligence-powered future for medical education, where technology and teaching methods come together to improve learning.

The addition of artificial intelligence into problem-based learning marks an exciting new direction [Wu D et al., 2020]. This guide offers a glimpse into the potential for ChatGPT-created scenarios to make the journey more engaging for students comfortable with digital technology. However, thoughtfully embracing innovation remains key – artificial intelligence is not a magic solution. With purposeful use in line with learning goals, conversing with ChatGPT can unlock enriching new possibilities for anatomy education.

As medical schools welcome progressively tech-savvy learners, practical adaptations integrating innovations like ChatGPT can prove worthwhile [Owolabi J, Bekele A, 2021]. However, it is still impossible to fully replace human teachers with artificial intelligence and ensure academic

standards are met [Wang C, 2021]. The potential for improving medical education is highly anticipated as artificial intelligence research and its applications are being advanced [Paranjape K et al., 2019; Wartman S, Combs C, 2019]. These novel possibilities could significantly change how learning is done while ensuring it is done correctly. Though they appear highly promising, these new ideas must be cautiously investigated.

CONCLUSION

Integrating artificial intelligence, such as ChatGPT, into problem-based learning scenarios holds promise for enhancing anatomy education, making it more engaging. However, it requires careful guidance and assessment to maintain academic standards. There is still a need for well-designed research to establish the influence on critical thinking and knowledge acquisition. This guide offers a structured framework for creating extra educational resources using ChatGPT's conversational capabilities, but it's essential to note that human educators cannot be completely replaced. As medical education improves to meet the requirements of proficient technology students, artificial intelligence integration shows promise when aligned with learning objectives. Continued research is crucial to understanding the benefits of artificial intelligence while preserving quality education. Problem-based learning scenarios incorporating artificial intelligence might enhance medical education without displacing current approaches with proper research and alignment with teaching concepts.

RECOMMENDATIONS

- This guide provides a framework for developing problem-based learning scenarios in anatomy using ChatGPT. This guidelines' emphasis on goal alignment, scenario creation, and facilitation makes it adaptable to various medical courses.
- Educators can also apply elements of the systematic design process described in this study without artificial intelligence.
- Continuous evaluation of educational outcomes is needed to validate the methodology's impact over time. As artificial intelligence advances, its integration warrants continued exploration paired with safeguards to ensure academic standards.

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REFERENCES

1. Abd Hakim NW, Talib CA (2018). Measuring critical thinking in science: systematic review. *Asian Social Science*. 14(11): 1-9
2. Aini D, Latifah S, Hamid A (2021). Problem Based Learning (PBL) Model: Its Effect in Improving Students' Critical Thinking Skill. *Indonesian Journal of Science and Mathematics Education*. 4(2): 183-190
3. Chary M, Parikh S, Manini AF, Boyer EW, Radeos M (2019). A review of natural language processing in medical education. *Western Journal of Emergency Medicine*. 20(1): 78
4. Dede C (2005). Planning for neomillennial learning styles: Implications for investments in technology and faculty. *Educating the next generation*. 5: 1-32
5. DiLullo C (2020). Learners of a new generation. *Teaching anatomy: A practical guide*. 11-21
6. Dolianiti F, Tsoupourogrou I, Antoniou P, Konstantinidis S, Anastasiades S, Bamidis P (2020). Chatbots in healthcare curricula: the case of a conversational virtual patient. *Brain Function Assessment in Learning: BFAL 2020. Lecture Notes in Computer Science*. Springer. 12462: 137-147 DOI: 10.1007/978-3-030-60735-7_15
7. Hawamdeh M, Adamu I (2021). Problem-Based Learning (PBL): A Deep Approach to Learning in the 21st Century. *Improving Scientific Communication for Lifelong Learners*: IGI Global. 38-56
8. Hung W (2015). Problem-based learning: Conception, practice, and future. *Authentic problem solving and learning in the 21st century: Perspectives from Singapore and beyond*. 75-92
9. McCombs BL (2017). Historical review of learning strategies research: strategies for the whole learner – A tribute to Claire Ellen Weinstein and early researchers of this topic. *Frontiers in Education*. Frontiers Media SA. DOI:10.3389/educ.2017.00006
10. Mennin S (2021). Ten global challenges in medical education: wicked issues and options for action. *Medical Science Educator*. 31(1): 17-20
11. Owolabi J, Bekele A (2021). Medical educators' reflection on how technology sustained medical education in the most critical times and the lessons learnt: insights from an African medical school. *Digital Health*. 7: 20552076211059358
12. Paek S, Kim N (2021). Analysis of worldwide research trends on the impact of artificial intelligence in education. *Sustainability*. 13(14): 7941
13. Panesar K (2020). Conversational artificial intelligence-demystifying statistical vs linguistic NLP solutions. *Journal of Computer-Assisted Linguistic Research*. 4: 47-79
14. Paranjape K, Schinkel M, Panday RN, Car J, Nanayakkara P (2019). Introducing artificial intelligence training in medical education. *JMIR medical education*. 5(2): e16048
15. Putranta H, Kuswanto H (2018). Improving students' critical thinking ability using problem based learning (PBL) learning model based on PhET simulation. *SAR Journal*. 1(3): 77-87
16. Rathore NP, Dangi M (2021). Embedding Artificial Intelligence into Education: The New Normal. *Applications of Artificial Intelligence in Business, Education and Healthcare*. 255-270
17. Sartika W, Rahman SR, Irfan M (2023). Empowering students' critical thinking skills using problem-based learning. *Inornatus: Biology Education Journal*. 3(2): 67-74
18. Schmidt SW, Dickerson J, Kisling E (2010). From pedagogy to andragogy: Transitioning teaching and learning in the information technology classroom. *Integrating Adult Learning and Technologies for Effective Education: Strategic Approaches*: IGI Global. 63-81
19. Selwyn N (2012). *Education in a digital world: Global perspectives on technology and education*: Routledge. 192p

20. Subagja CJ (2023). Enhancing Student Engagement and Active Participation in Dynamic Electricity Problem-Solving through Problem-Based Learning (PBL). *Journal of Resource Management, Economics and Business*. 2(1): 7-15
21. Wang C (2021). The value orientation of teachers' role in artificial intelligence teaching environment based on information technology. 2021 4th International Conference on Information Systems and Computer Aided Education. DOI:10.1145/3482632.3483059
22. Wartman SA, Combs CD (2019). Reimagining medical education in the age of AI. *AMA journal of ethics*. 21(2): 146-152
23. Weitz K, Schlagowski R, André E (2021). Demystifying artificial intelligence for end-users: findings from a participatory machine learning show. *German Conference on Artificial Intelligence (Künstliche Intelligenz)*. Springer. DOI: 10.1007/978-3-030-87626-5_19
24. Wu D, Xiang Y, Wu X, Yu T, Huang X, Zou Y, et al (2020). Artificial intelligence-tutoring problem-based learning in ophthalmology clerkship. *Annals of Translational Medicine*. 8(11): 700
25. Zimmerman SD, Lester Short GF, Hendrix EM, Timson BF (2011). Impact of interdisciplinary learning on critical thinking using case study method in allied health care graduate students. *Journal of Allied Health*. 40(1): 15-18



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