MERGING LANES: WHERE E-LEARNING DIVERSITY MEETS FUTURE TRENDS

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CHATGPT AS AN AI TUTOR IN LEARNING ENVIRONMENTS

*Fuziatul Norsyiha[1], Mawardi Omar[2], Norshuhada Samsudin[3] and Wan Nur Shaziayani[4]
**fuziatul@uitm.edu.my[1], mawardio@uitm.edu.my[2], norsh111@uitm.edu.my[3], shaziayani@uitm.edu.my[4]*

[1,2,3,4]Jabatan Sains Komputer & Matematik (JSKM),
Universiti Teknologi MARA Cawangan Pulau Pinang, Malaysia

**Corresponding author*

ABSTRACT

The integration of artificial intelligence (AI) in education has transformed how students access information, engage with content, and receive instructional support. Among AI tools, ChatGPT, a conversational large language model, has emerged as a promising AI tutor capable of providing personalized guidance, adaptive feedback, and interactive explanations tailored to students' learning needs. This paper examines the role of ChatGPT in supporting self-regulated learning and enhancing student engagement across diverse learning environments, including face-to-face, blended, and online contexts. While ChatGPT offers immediacy, scalability, and accessibility, its integration raises pedagogical and ethical challenges, including potential overreliance, misconceptions from AI-generated responses, and academic integrity concerns. An illustrative example from a MAT183 assessment demonstrates how students may use ChatGPT to obtain correct answers while diverging from prescribed instructional methods, highlighting both its potential and limitations. The study concludes that ChatGPT is most effective when implemented within a balanced, hybrid model, complementing human educators' guidance, fostering critical thinking, and supporting inclusive and meaningful learning experiences.

Keywords: Artificial Intelligence (AI), ChatGPT, AI Tutor, learning environments, mathematics

Introduction

The increasing integration of artificial intelligence (AI) into education has transformed how students access information, engage with content, and receive instructional support. Across various learning environments, including face-to-face classrooms, blended settings, and fully online platforms, educators are seeking innovative approaches to address student diversity and enhance learning effectiveness. Despite advances in educational technology, many learning environments continue to rely on uniform instructional methods that offer limited responsiveness to student's needs.

AI-based tutoring systems have emerged as a promising solution to support personalized learning by providing adaptive guidance, feedback, and explanations tailored to students' interactions. Among these systems, ChatGPT, a conversational AI powered by a large language model, has gained widespread attention for its ability to engage students through natural language interaction. ChatGPT enables students to ask questions, request clarification, and explore concepts in a dialogic manner, resembling aspects of one-to-one tutoring. For instance, if a student is having difficulty comprehending a particular mathematical concept, they could use the model to generate practice problems tailored to

their level of proficiency (Antonio Flores Limo et al., n.d., 2023). Hence, ChatGPT could be especially advantageous for individuals with learning disabilities, language barriers, and non-native speakers, providing them with a more accessible and personalized learning experience(Graefen & Fazal, 2025).

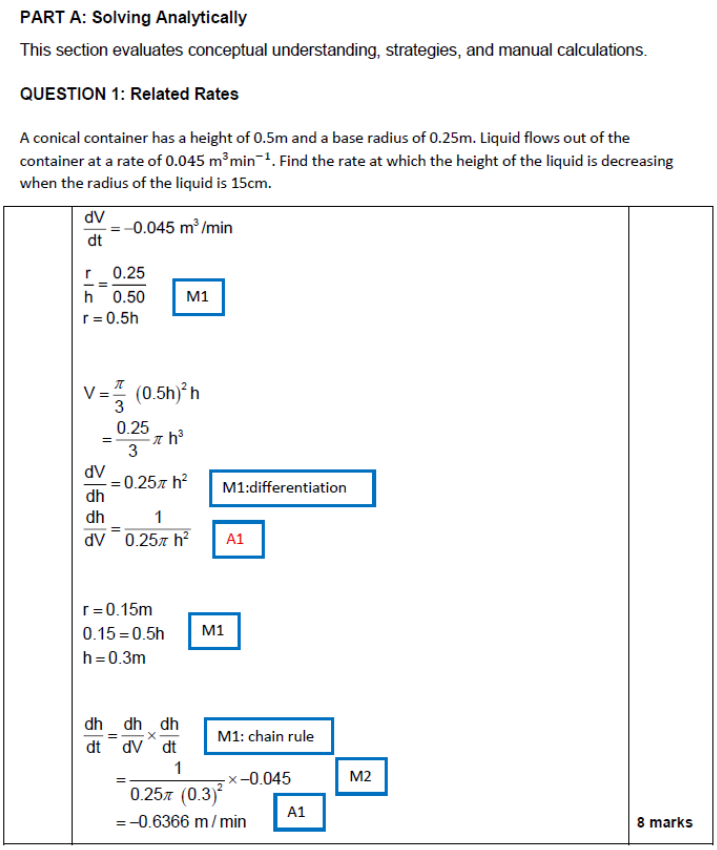
In learning environments, ChatGPT is increasingly used by students as a supplementary learning tool to support understanding during and beyond formal instruction. Its capacity to generate explanations at varying levels of complexity allows students to revisit concepts at their own pace and according to their individual learning preferences. As such, ChatGPT has the potential to function as an AI tutor that supports self-regulated learning, reinforces instructional content, and enhances student engagement. According to (Alshahrani & Qureshi, 2024), the successful integration of ChatGPT with interactive educational platforms represents a significant milestone in the field of education. Additionally, the integration of Chat GPT with virtual tools, such as a histology slide application, could provide real-time learning opportunities (Graefen & Fazal, 2025).

However, the integration of ChatGPT as an AI tutor also raises important pedagogical considerations. While AI tutors offer immediacy, scalability, and flexibility, they do not possess the pedagogical judgment, emotional awareness, or contextual understanding inherent to human educators. From the educators' viewpoint, the study goes beyond assessing ChatGPT's pros and cons by identifying the institutional training necessary for its effective integration into teaching. The effectiveness of ChatGPT as an AI tutor therefore depends on how it is positioned within learning environments and how its use is aligned with instructional goals and educator guidance.

AI tutors may reduce students' ability to think critically, solve problems independently, or engage in productive struggle because students frequently used ChatGPT to seek direct answers to multiple-choice questions (MCQs), answers of which cannot be found on the Internet (Durgungoz & Kharrufa, 2025). When students rely on AI for answers rather than reasoning processes, learning depth may be compromised. Besides that, AI tutors may generate incorrect, incomplete, or contextually inappropriate responses. Without proper guidance, students may accept AI-generated information uncritically, leading to misconceptions. Other than that, for ethical and academic integrity concerns, the use of AI tutors can raise issues related to plagiarism, originality, and academic honesty. Students may use AI to complete assignments rather than as a learning aid. Thus, as AI grows, teachers will need to develop emotional intelligence, information literacy, and higher-order thinking skills, all of which require professional training and lifelong learning to effectively implement personal learning environments according (Xu et al., 2023).

An example demonstrating how ChatGPT is utilized as a tutor in student assessment activities

Figure 1 presents the suggested answer scheme for the MAT183 assessment. In this assessment, students were explicitly taught to apply the chain rule method when solving related rates questions. The use of the chain rule method is emphasized as the correct problem-solving approach, and full marks are given to students who apply this method accurately in their solutions.



PART A: Solving Analytically

This section evaluates conceptual understanding, strategies, and manual calculations.

QUESTION 1: Related Rates

A conical container has a height of 0.5m and a base radius of 0.25m. Liquid flows out of the container at a rate of 0.045 $m^3 min^{-1}$. Find the rate at which the height of the liquid is decreasing when the radius of the liquid is 15cm.

$\frac{dV}{dt} = -0.045\ m^3/min$

$\frac{r}{h} = \frac{0.25}{0.50}$ M1

$r = 0.5h$

$V = \frac{\pi}{3}(0.5h)^2 h$

$= \frac{0.25}{3}\pi h^3$

$\frac{dV}{dh} = 0.25\pi h^2$ M1:differentiation

$\frac{dh}{dV} = \frac{1}{0.25\pi h^2}$ A1

$r = 0.15m$

$0.15 = 0.5h$ M1

$h = 0.3m$

$\frac{dh}{dt} = \frac{dh}{dV} \times \frac{dh}{dt}$ M1: chain rule

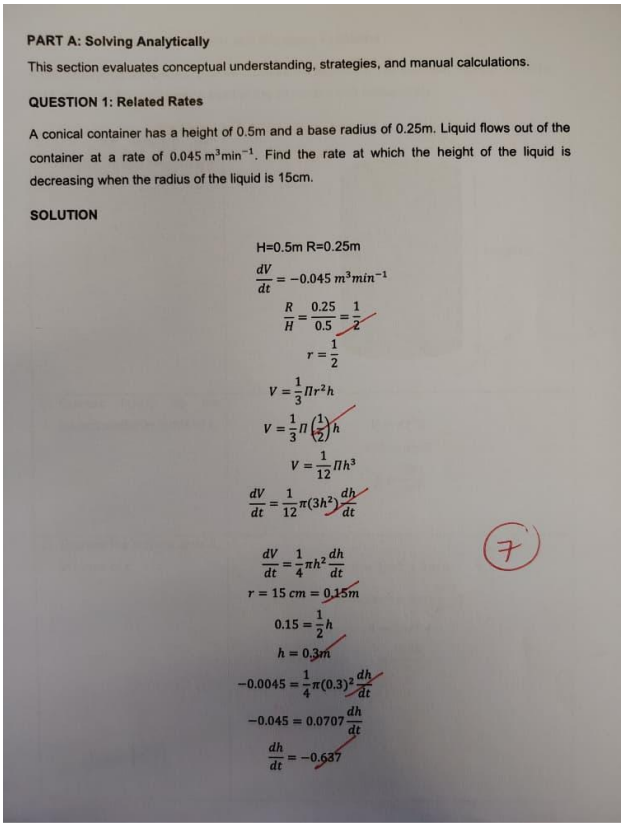
$= \frac{1}{0.25\pi (0.3)^2} \times -0.045$ M2

$= -0.6366\ m/min$ A1

8 marks

Figure 1: Suggested answer schemed of Assessment MAT183

Figure 2 shows a student's solution to the related rates question. The student may have received assistance from ChatGPT, as the solution does not employ the chain rule method, which was the prescribed approach for solving this question. Instead, the student applied the implicit differentiation method to obtain the result. Although the final answer is consistent with the suggested answer scheme, the solution does not follow the method emphasized during instruction. Therefore, the student would not be awarded full marks for this question, as the assessment criteria require the correct use of the chain rule method.



PART A: Solving Analytically

This section evaluates conceptual understanding, strategies, and manual calculations.

QUESTION 1: Related Rates

A conical container has a height of 0.5m and a base radius of 0.25m. Liquid flows out of the container at a rate of $0.045\ m^3min^{-1}$. Find the rate at which the height of the liquid is decreasing when the radius of the liquid is 15cm.

SOLUTION

H=0.5m R=0.25m

$$\frac{dV}{dt} = -0.045\ m^3min^{-1}$$

$$\frac{R}{H} = \frac{0.25}{0.5} = \frac{1}{2}$$

$$r = \frac{1}{2}$$

$$V = \frac{1}{3}\Pi r^2 h$$

$$V = \frac{1}{3}\Pi\left(\frac{1}{2}\right)h$$

$$V = \frac{1}{12}\Pi h^3$$

$$\frac{dV}{dt} = \frac{1}{12}\pi(3h^2)\frac{dh}{dt}$$

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$$\frac{dV}{dt} = \frac{1}{4}\pi h^2\frac{dh}{dt}$$

$$r = 15\ cm = 0.15m$$

$$0.15 = \frac{1}{2}h$$

$$h = 0.3m$$

$$-0.0045 = \frac{1}{4}\pi(0.3)^2\frac{dh}{dt}$$

$$-0.045 = 0.0707\frac{dh}{dt}$$

$$\frac{dh}{dt} = -0.637$$

Figure 2: Student's solution

Although the student obtained the correct final answer, the solution diverged from the method emphasized during instruction. This suggests that while AI tutors like ChatGPT can support conceptual understanding, they may also encourage alternative problem-solving approaches that do not fully align with the lecturer's teaching. From a mathematical standpoint, the student demonstrated an understanding of the underlying relationships by applying implicit differentiation, which is a valid and logically sound method. However, from an instructional perspective, the assessment was designed not only to evaluate the correctness of the final answer but also to measure the student's ability to apply the specific method which is Chain Rule method. Hence, the student may not receive full marks despite arriving at the correct solution, which could affect overall academic performance and perceived achievement. However, the effect is not entirely negative. Exposure to alternative solution strategies may also enhance mathematical flexibility and adaptive thinking, which are valuable higher-order skills. The key issue is not the alternative method itself, but whether the student understands when and why a specific method is required.

Conclusion

As a conclusion, ChatGPT represents both a significant opportunity and a substantial challenge for the education sector. Its capacity to provide instant feedback, personalized explanations, and adaptive support positions it as a powerful supplementary tool within contemporary learning environments. As an AI tutor, ChatGPT can enhance student engagement, promote self-regulated learning, and offer additional academic assistance beyond classroom hours. These features are particularly valuable in addressing diverse learner needs and supporting students who require flexible or individualized learning pathways. However, the integration of ChatGPT into education must be approached with careful pedagogical consideration. While AI can facilitate conceptual understanding and expose students to multiple problem-solving strategies, it may also create misalignment with instructional objectives if not properly guided. As illustrated in the assessment example, students may arrive at correct answers using alternative methods that diverge from those emphasized during instruction. Such situations highlight the importance of maintaining alignment between learning outcomes, teaching strategies, and assessment criteria. Furthermore, concerns regarding overreliance, reduced critical thinking, and academic integrity underscore the need for structured and responsible AI use. Ultimately, the effective implementation of ChatGPT as an AI tutor depends on a balanced, hybrid approach that leverages the strengths of AI while preserving the pedagogical oversight of educators.

References:

Alshahrani, K., & Qureshi, R. J. (2024). Review the Prospects and Obstacles of AI-Enhanced Learning Environments: The Role of ChatGPT in Education. *International Journal of Modern Education and Computer Science*, *16*(4), 71–86. https://doi.org/10.5815/ijmecs.2024.04.06

Antonio Flores Limo, F., Raul Hurtado Tiza, D., Mamani Roque, M., Espinoza Herrera, E., Patricio Muñoz Murillo, J., Jinchuña Huallpa, J., Andre Ariza Flores, V., Guadalupe Rincón Castillo, A., Nacional Micaela Bastidas De Apurímac, U., Paolo Martel Carranza, C., & Luis Arias Gonzáles, J. (n.d.). *Personalized tutoring: ChatGPT as a virtual tutor for personalized learning experiences Percy Fritz Puga Peña*. Retrieved http://orcid.org/0000-0002-4905-9535

Durgungoz, A., & Kharrufa, A. (2025). "ChatGPT is like a study buddy, a teacher and sometimes just a friend": a longitudinal exploration of students' interactions, perception and acceptance. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2025.2509276

Graefen, B., & Fazal, N. (2025). Advancing Education through AI: The Role of ChatGPT as Virtual Tutors in the Future of Learning. *Annals of Pharmacy Education, Safety, and Public Health Advocacy*, *3*(1), 12–22. https://doi.org/10.51847/luftksf1zo

Xu, X., Wang, X., Zhang, Y., Zhang, H., & Wu, Y. (2023). Applying ChatGPT to Tackle the Side Effects of Personal Learning Environments in Higher Education: A Teacher and Teaching Perspective. *Frontiers in Artificial Intelligence and Applications*, *374*, 73–88. https://doi.org/10.3233/FAIA230769

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