

THE PERCEPTIONS OF ARTIFICIAL INTELLIGENCE AMONG MATHEMATICS LECTURERS IN UiTM CAWANGAN PULAU PINANG

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ABSTRACT

This study explores the perceptions of artificial intelligence (AI) among mathematics lecturers at Universiti Teknologi MARA Cawangan Pulau Pinang (UiTM CPP). Given AI's potential to revolutionize education by enhancing teaching, learning, and administrative processes, understanding lecturers' viewpoints is crucial for effective integration. Data were collected through a structured questionnaire distributed to mathematics lecturers, focusing on their familiarity with AI, perceptions of its application in mathematics education, and its practical usage. The findings reveal that while most lecturers acknowledge the benefits of AI in providing personalized learning experiences and assisting with grading, there are concerns about data privacy, job security, and the effort required to learn AI technologies. Despite these concerns, most lecturers actively use AI tools, with ChatGPT being the most popular. The study underscores the importance of addressing these concerns to facilitate the successful adoption of AI in mathematics education.

Keywords: AI, Mathematics lecturers, education, perceptions

Introduction

Artificial intelligence (AI) has the potential to revolutionize industries and improve efficiency in various fields. It has the ability to automate tasks, analyse data at large scales, and make predictions based on patterns. AI can also enhance decision-making processes by providing valuable insights and recommendations. Its capabilities continue to progress, thus making it a valuable tool for those looking to stay competitive in the digital age.

Nowadays, AI has been widely integrated into education for its advantages and potential. The application of AI in education has evolved to various aspects, including AI tools designed to support learning and assessment, aid in teaching, and manage educational institutions. AI technologies in Science, Technology and Mathematics (STEM) education have transformed instructional and learning design processes, enhancing educational experiences (Xu & Ouyang, 2022). In addition, AI in education aims to improve student learning outcomes, support teachers, and provide personalized educational experiences (Alkan, 2024).

AI has been increasingly integrated into a lot of educational fields including mathematics. Studies have shown that utilizing Information and Communication Technology (ICT) tools in mathematics education can enhance practice problems and provide tailored feedback thus enable lecturers to monitor students' progress and address individual needs effectively (Katakara, 2024). Stefanova (2024) stated that AI systems in mathematics education are typically categorized into AI-based calculators and Intelligent Tutoring Systems (ITS). These systems aim to personalize learning experiences, adapt instruction to students' requirements, and enhance the quantitative competence of learners (Remoto, 2023).

In the context of mathematics education, the implementation of AI is another approach to improve teaching quality, effectiveness, and student outcomes. According to Imran (2023), the use of AI in mathematics education is perceived as a long-term investment that contributes to continuous improvement in educational quality for both lecturers and students. Although there are significant benefits to incorporating AI in mathematics education, there are also challenges such as the need for lecturers to adapt to modern teaching strategies that use AI techniques.

The perceptions of mathematic lecturers regarding artificial intelligence (AI) are essential for guiding the effective integration of AI technologies into mathematics education. While AI has the potential to revolutionize instructional methods and offer innovative educational tools, the specific viewpoints of mathematics lecturers on these technologies are not fully understood. Mathematics lecturers might have varying opinions on AI, with some perceiving it as a beneficial tool that can improve teaching and increase student engagement (Xie, 2023), while others may have concerns about its effectiveness, its potential to disrupt established teaching practices, or its impact on their professional responsibilities (Weidener & Fisher, 2023). Understanding these perceptions is essential for developing effective strategies for AI adoption and ensuring that AI tools are implemented in ways that align with lecturers' needs and expectations.

The aim of this study is to understand the adoption of AI among mathematics lecturers at Universiti Teknologi MARA Cawangan Pulau Pinang (UiTM CPP) through questionnaires. Next is to gain insight into the lecturer's perception of the utilisation of AI in education. This study will be beneficial to observe the usage of AI among mathematics lecturers and how they perceive the adoption of this new technology in education.

Methodology

The important part of this research is data collection. A set of questionnaires was adopted based on the research questions from Chounta et al., (2022). The questionnaire was distributed online by emailing

all mathematic lecturers in the Department of Computer and Mathematical Sciences, UiTM Pulau Pinang.

The questionnaires were divided into four sections: respondents' demographic information, respondents' familiarity about AI, perceptions of AI in mathematics education and AI in practice among lecturers. The quantitative data were analysed to determine the frequencies and percentages.

Results and Discussion

Demographic

This research involved 16 mathematics lecturers in UiTM CPP who taught mathematics for diploma and degree levels. Table 1 illustrates that 37.5% are from the 30 – 39-year-old group, 43.8% from the 40 – 49-year-old group and lecturers aged 50 and above constitute the remaining 18.8%. Among the lecturers, 12 are females, and the remaining are males. In relation to teaching experience, most lecturers fall within the 11 – 20 years of teaching experience range, comprising 56.3%, while 25% have 5 – 10 years of teaching experience, 12.5% have more than 20 years of teaching experience, and only 6.3% have less than 5 years experience. Of the total respondents, 87.5% have a master's degree as their highest academic qualification, while only 12.5% have a PhD.

Table 1: Demographics profile

Details	Frequency	
Age	Under 30	-
	30 -39	6
	40 – 49	7
	50 - 59	3
Gender	Male	4
	Female	12
Teaching experience	Less than 5 years	1
	5 – 10 years	4
	11 – 20 years	9
	More than 20 years	2
Highest degree obtained	Bachelor's Degree	-
	Master's Degree	14
	Doctor of Philosophy (PhD)	2

Perception of AI among mathematics lecturers

Three sections of the questionnaire regarding the perception of AI among mathematics lecturers were analysed.

Familiarity of AI

Two questions were asked in this section of the questionnaire.

1. What do you know about Artificial Intelligence?
2. 80% of the respondents know what AI is and another 20% have limited knowledge about AI.
3. Have you ever used an AI application?
4. All of the respondents answered “Yes”.

Perceptions of AI in Mathematics Education

In this section, three questions were asked in the questionnaire. Respondents can select multiple choice as their answer.

Table 2: Statements about AI in mathematics education

Mark the statements you think are true about AI in mathematics education	
a. AI can enhance the teaching and learning of mathematics	100%
b. AI can assist in grading and providing feedback on student assignments	53.3%
c. AI can identify and address individual student learning needs	60%
d. AI poses a threat to the job security of mathematics lecturers.	20%

From Table 2, All respondents believe that AI can enhance the teaching and learning of mathematics. This unanimous agreement highlights the potential of AI to revolutionize educational practices by providing personalized learning experiences, adaptive learning platforms, and intelligent tutoring systems. A significant majority of respondents (53.3%) agree that AI can assist in grading and providing feedback on student assignments. AI-powered grading systems can save time for educators by automating the assessment process, ensuring consistency and objectivity. 60% of respondents believe that AI can identify and address individual student learning needs. Only 20% of respondents feel that AI poses a threat to the job security of mathematics lecturers. This lower percentage suggests that while there are some concerns about AI replacing human educators, the majority believe that AI will augment rather than replace their roles.

In our next step, we aimed to understand mathematics lecturers' views on using AI in education. To achieve this, we asked participants to identify the positive and negative aspects of integrating AI in education using multiple-choice inputs. The results can be found in Table 3. Additionally, we allowed them to provide their input.

Table 3: Participants' perceptions regarding positive and negative aspects of AI use in education

Positive aspects	Negative aspects
It could help me to save time when creating a time plan for my lesson (75%)	It would require effort to learn how to use it (31.3%)
It could help me to save time when looking for materials/content for my lesson (81.3%)	I'm scared it could take someone else's job (37.5%)
It could help me to save time when reviewing homework (75%)	I don't trust it to carry out tasks without error (75%)
It could help me make less errors (50%)	My work requires human involvement and i don't think AI can do what is needed (56.3%)
It could help me to create interactive and adaptive learning tools (6.3%)	I'm concerned about the privacy and data security issues (68.8%)
	Derivations done by AI must be double-checked (6.3%)
	AI may not provide the same personal interaction and empathy that human can offer (6.3%)

According to their responses regarding the positive aspects, participants stated that AI could save them time doing lecturers' tasks and also help them make fewer errors. Concerning the negative aspects of AI, even though they use AI, most of them (75%) do not trust AI to carry out tasks without error. The majority are also concerned about privacy and data security issues. From the findings, some participants (31.3%) also see the negative aspect of AI as it would require effort to learn how to use AI.

AI in Practice

Figure 1 shows that 75% of the participants have participated in professional development or training related to AI. According to their answer, most of the training or workshops they have participated in are general workshops about AI, such as "Introduction to ChatGPT" and "Applications of AI for research".

Have you participated in any professional development or training related to AI?

16 responses

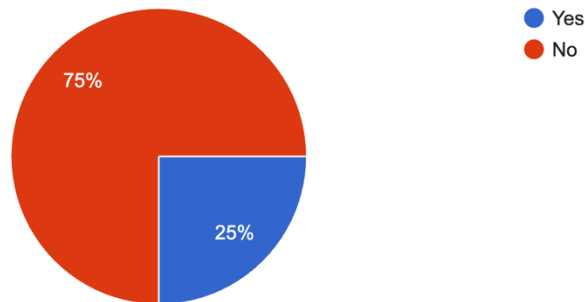


Figure 1. Pie chart of participants who participated in training related to AI.

Figure 2 shows that most participants use AI for administrative tasks. The majority also use AI to help them plan the lesson in terms of content (66.7%) and in terms of time (60%). This shows that the participants really use AI to assist their tasks in administration and teaching and learning.

What areas of your work could be supported by AI? May choose more than one.

15 responses

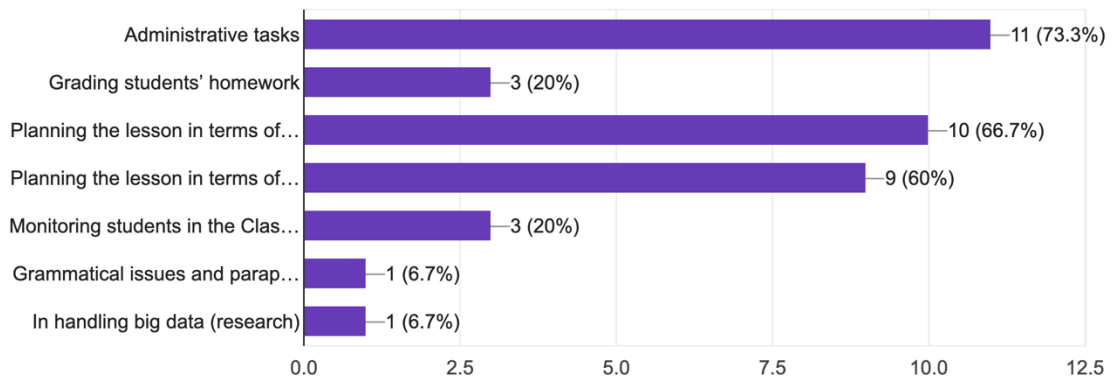


Figure 2. Areas supported by AI.

Figure 3 shows that only two mathematical applications have been used by the lecturers in their classrooms. 57.1% use GeoGebra while the other remaining use Wolfram Alpha. These two applications are the most popular among lecturers because they have been included in the syllabus.

What kind of mathematical applications do you use in your classroom?

14 responses

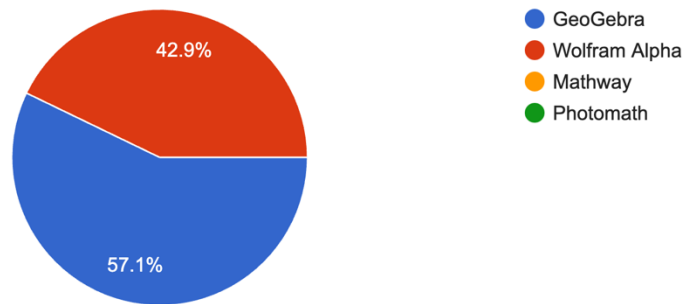


Figure 3. Mathematical applications use in the classroom

As expected, ChatGPT is the most popular AI program used by the lecturers (93.8%). The second most used is Co-pilot (43.8%) and the third is the Gemini by Google (12.5%). The last question in the questionnaire is whether the respondents subscribed to the premium version of the AI program they used. 87.5% do not subscribe to any premium version, while only 6.3% subscribed to the premium version, and another 6.3% are still considering subscribing. The lecturer who subscribed to the premium version paid RM200/year.

Conclusion

In conclusion, all mathematics lecturers in UiTM CPP use AI in their administrative work and lectures to enhance student learning and engagement. Integration of AI in mathematics education can improve teaching practices, personalize learning, and improve student outcomes. It is crucial for lecturers to adopt this technology to enhance the overall learning experience for students. Failing to do so may result in falling behind in providing students with the most effective and engaging educational opportunities. Lecturers and students may optimize the use of AI in teaching and learning by incorporating it in various educational activities and assessments.

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