Unlocking the Future: Factors Driving Cognitive Readiness to Adopt AI among Postgraduate Diploma in Education Students

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ABSTRACT

Along with the booming development of the digital world and technology, the educational landscape around the world is undergoing an aggressive transformation. To meet current needs, the trend of using artificial intelligence (AI) is being actively promoted in Malaysia, including Sabah. Therefore, a cross-sectional quantitative study was conducted to assess the AI readiness among of 115 postgraduate Diploma in Education students from Universiti Malaysia Sabah. Respondent was selected through a simple random sampling technique. Descriptive analysis and Partial Least Squares Structural Equation Modelling (PLS-SEM) were used to analyse survey response. The results indicated that AI TPACK anda motivation has positive effects on cognitive readiness to use AI. Further findings revealed that gender moderates the relationship between AI TPACK and cognitive readiness, where this relationship is strengthened among male teachers. By identifying key drivers of readiness to use AI, the study informs academic policymakers anda pedagogical practices in understanding the most effective strategies for enhance prospective teacher cognitive readiness to accept and adapt AI in real classroom.

Keywords: Artificial Intelligence (AI), prospective teacher, cognitive readiness, intrinsic motivation, AI TPACK

INTRODUCTION

The trend of using technology in teaching requires the educational community to transform conventional teaching methods into more innovative teaching by integrating various types of the latest technology (Bello et al., 2023). Along with the implementation of the Digital Education Policy, one of the innovative technologies actively promoted among the educational community is AI. Although the application level of AI is still in its early stages, this technology has been identified as having great potential in the field of education (Ghoni, 2025). According to Maghsudi et al. (2021), through AI, personalized learning can be created through intelligent tutoring systems or ITS. ITS is referred to as the use of a combination of adaptation and personalized guidance based on generative artificial intelligence technology that allows the teaching and learning (T&L) process to be carried out even without the physical presence of a teacher. Lin and Lai (2021) explain that ITS is able to monitor, diagnose learning problems and provide feedback on student development effectively. Furthermore, Wang et al. (2021) argue that personalized learning can also provide a real and more meaningful learning experience through interactive learning. Therefore, it is a necessity to provide the education community, including prospective teachers, with the ability to integrate AI in teaching and learning (T&L) sessions. According to Guan et al., (2024), the ability to integrate AI is closely related to an individual's cognitive readiness to use the technology. It is assumed that the ability to use technology increases exponentially with an individual's cognitive readiness. Park et al. (2023) confirmed that the aspect of cognitive readiness to use has a significant positive influence in increasing teachers' intention to try AI in the future. However, Russo et al. (2025) survey confirmed that the level of cognitive readiness to use AI among diploma in education students is low. This finding is in line with the findings of the study by Fathi and Ebadi (2020).

LITERATURE REVIEW

Artificial Intelligence in Higher Education in Malaysia

In Malaysia, the integration of AI technologies into higher education was formally acknowledged in an advisory letter issued by the Malaysia Qualification Agency (MQA) on March 31, 2023 (Malaysia Qualification Agency, 2023). The advisory emphasized several educational benefits of AI, including its capacity to support adaptive learning by tailoring responses to students' individual needs, interests, and comprehension levels. Additionally, AI tools were found to foster more interactive teaching and learning experiences between educators and learners (Sila et al., 2023). However, it was found that 13.59% of the use of AI technology was for student assessment purposes. While only 10.62% was used for teaching and guidance purposes. This statistical data confirms that the level of AI usage is still minimal. Meanwhile, 79.4% of respondents consisting of academics in public universities showed agreement in support of the establishment of the use of AI in the educational landscape in Malaysia (National Professors Council, 2023).

AI Cognitive Readiness

According to Martin et al. (2024), cognitive readiness is referred to as the mental preparation (including knowledge, abilities, skills, motivation) of an individual to adapt to an innovation. In general, the components of cognitive readiness are different, depending on the type and level of innovation. Gasparini (2023) explains that cognitive readiness plays an important role in pedagogical adaptation which helps teachers understand the function of certain technology in supporting various types of teaching. According to Crameri et al. (2021), the main factors that determine cognitive readiness are closely related to psychological factors such as motivation. At the same time, other factors related to the cognitive formation of individuals such as basic knowledge also play an important role in shaping an individual's cognitive readiness. Therefore, this study will assess the direct impact of intrinsic motivation and AI TPACK on teachers' readiness to use AI. In the context of this study, the effects of intrinsic motivation and AI TPACK will be explained using Self determination theory (SDT) and the TPACK Framework

Self Determination Theory (SDT)

Based on SDT, intrinsic motivation is formed through autonomy, competence and relatedness. Jose and Jose (2024) confirmed that the main motivation for teachers to use technology is to increase efficiency or professionalism in teaching aspects. Therefore, competence significantly contribute to teachers' readiness to adopt AI in educational settings. On the other hand, in terms of autonomy, Al-Mughairi and Bhaskar (2024) argue that teachers who show a great interest in innovative educational technologies are more ready to adopt AI.

TPACK Framework

Based on this model, effective integration of AI technology requires the intersection of content, pedagogy and technological knowledge, known as AI TPACK. TPACK play a big role in shaping teacher's comprehenion about AI technology (Ning et al., 2023). Without understanding, teachers may reject the use of technology (Mishra & Kohler, 2006). Teachers with strong TPACK are more likely to feel confident and ready to use AI.

Hypotheses development

Intrinsic Motivation

All individuals need internal strength to be used as a motivator in starting an activity, task or action (Collie, 2023). This internal strength is known as intrinsic motivation. According to Tahiru (2021), AI integration becomes more consistent when teachers are internally driven to explore and adapt. Gasparini et al. (2023) argue that there is a significant positive relationship between intrinsic motivation and individual readiness in using technology among teachers. A high level of intrinsic motivation increases teachers' readiness to use technology (Guan et al., 2025).

H1. Intrinsic motivation significantly predicts cognitive readiness to use AI

AI TPACK (AI Technological Pedagogical Content Knowledge)

According to Ning et al. (2024), TPACK is knowledge that is built from a combination of pedagogical knowledge, content knowledge and technological knowledge. According to Nguyen & Trent (2022) in the context of teaching, TPACK increases teachers' understanding of the use of technology in teaching through the selection of appropriate teaching strategies and materials so that learning content can be delivered effectively. In general, TPACK is a knowledge platform to examine teachers' knowledge more accurately because it depicts the integration of technology in teaching through an emphasis on pedagogical and content aspects (Park & Son, 2022). Good mastery of TPACK increases teachers' cognitive readiness to use a technology (Velander et al., 2024). However, Lee and Perret (2022) identified teachers' lack of AI knowledge as a barrier to AI readiness among future teacher. Therefore, a survey on the influence of AI TPACK on cognitive readiness is relevant to be conducted in preparation for the use of AI among prospective teachers.

H2. AI TPACK significantly predicts cognitive readiness to use AI

Gender as moderator

Zhang et al. (2023) confirmed that gender moderates the relationship between intrinsic motivation and readiness to use artificial intelligence. Statistically, the effect of intrinsic motivation is greater among male teachers than female teachers. The findings illustrate that male teachers are more excited and interested in using any new technology, including AI (Li & Zhang, 2024). The researchers also argue that male teachers are more concerned about transformation in education. On this basis, male teachers are more willing to use new technology than female teachers.

H3. The relationship between intrinsic motivation and cognitive readiness is stronger among male

On the other hands, the results of Collie and Martin (2024) survey found that there was a significant moderating effect of TPACK based on gender. It was reported that the strength of the relationship between AI TPACK and readiness to use the latest technology was stronger among males. According to Rais and Rashid (2023), comparatively, male teachers had better knowledge of technology than female teachers. It was found that male teachers were more knowledgeable about modern technology and had more experience in using technology than female teachers.

H4. The relationship between AI TPACK and cognitive readiness is stronger among male

RESEARCH METHODOLOGY

The design of this study is a quantitative study using a cross-sectional survey method. In this study, the perspectives of the respondents will be collected, analyzed and interpreted accurately and comprehensively. The respondents for this study were students from Diploma in Education at Universiti Malaysia Sabah (UMS). These groups were classified based on various demographics, including gender and field of study. Accordingly, simple random sampling technique is used in this study, with a minimum sample size of 115 diploma students. The research instrument uses a questionnaire that includes 39 items and consists of 4 parts, namely demographic information, knowledge, readiness and motivation using artificial intelligence. This instrument is adapted from questionnaires developed by Ning et al. (2024), Carolus et al. (2023) and Vermote et al. (2023). Data collection utilises a five-point Likert scale, namely Strongly Disagree (STS), Disagree (TS), Unsure (TP), Agree (S) and Strongly Agree (SS). Based on reliability analysis, it was found that the Cronbach's Alpha coefficient value for this questionnaire was .96. Therefore, this questionnaire was identified as having good internal consistency and stability and ready to be used in actual studies.In this study, descriptive analysis was used to identify the frequency distribution including of number and percentage. While, Partial Least Squares Structural Equation Modelling (PLS-SEM) was used for regression analysis, and moderation analysis for comparing data among different respondent group such as gender.

Research Findings

This research was conducted to obtain a more holystic analysis of AI acceptance among science teachers. Most of the respondents were female which was at 66 percent whereas 34 percent of them were male. In terms of specialization, 21 percent of respondents were from mathematics educatioan and 11 percent of respondents were from Islamic Religious Education.

Measurement Model

Internal consistency reliability for a research model refers to the composite reliability (CR) value and Cronbach's alpha. In the context of this study, assessing the level of reliability through the CR value involves reading values in the range of 0 to 1. According to Hair et al. (2017), reliability is at a satisfactory level if the CR value is between 0.600 to 0.700. Therefore, in this study, the CR value accepted refers to the view of Hair et al. (2017) which is ≥0.700. Apart for that, a Cronbach's alpha value > 0.70 is assumed to be sufficient and acceptable. The other important measurement of reliability showed that convergent validity was acceptable because the Average Variance Extracted (AVR) was over 0.5. The results for reliability and validity along with the factors loadings for the items of 5 constructs are presented in Table 1. The results for reliability and validity along with the factors loadings for the items are presented in Table 1.

Table 1. Loadings, Reliability and Validity

Variable	Construct	Loadings	Cronbach's alpha	AVE	CR
Intrinsic Motivation (IM)	MI1	0.887	0.929	0.744	0.945
	MI2	0.881			
	MI3	0.908			
	MI4	0.905			
	MI5	0.888			
	MI6	0.684			
AI-TPACK (TP)	TP1	0.859	0.924	0.739	0.944
	TP2	0.865			
	TP3	0.870			
	TP4	0.889			
	TP5	0.861			
	TP6	0.814			
Cognitive Readiness (CR)	CR1	0.914	0.919	0.719	0.938
	CR2	0.850			
	CR3	0.857			
	CR4	0.901			
	CR5	0.880			
	CR6	0.660			

Discriminant validity was assessed by the Heterotrait-Monotrait ratio of correlations (Henseler et al., 2015), with values below the threshold of 0.9.

Structural Model

Figure 1 illustrate the structural model presents the path coefficients among constructs. Meanwhile, Table 2 displays the results of path coefficients in evaluating the hypotheses constructed based on literature.

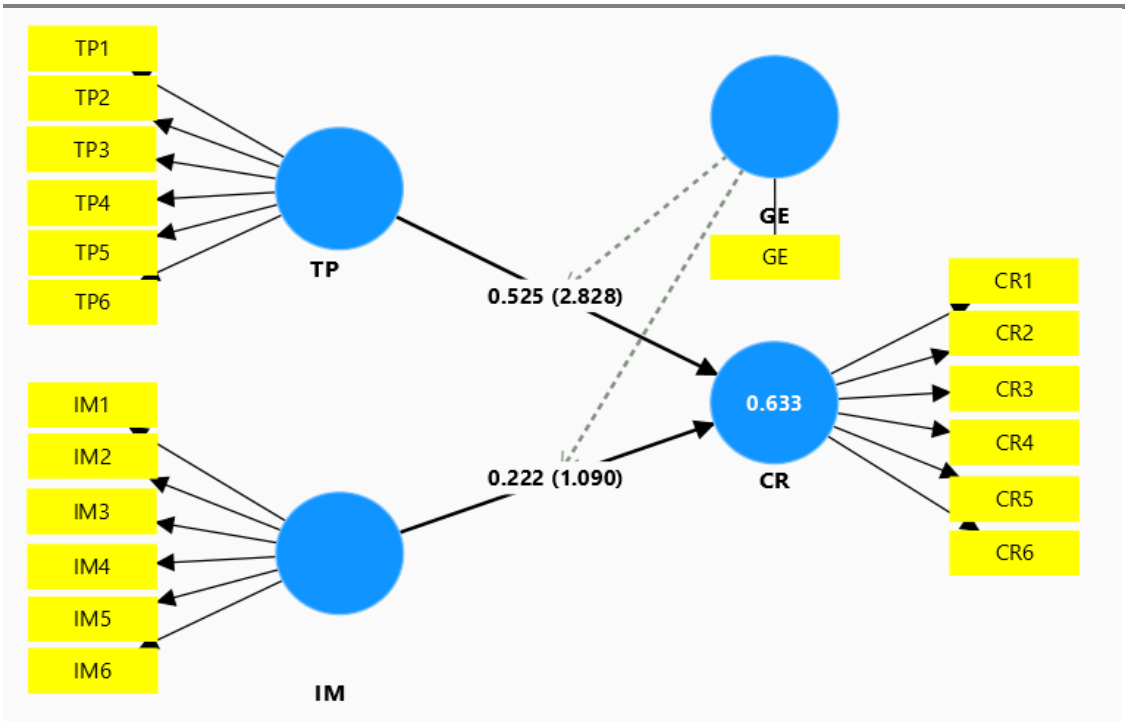

Fig. 1. Structural Model

The test on the significance of the path was conducted using SmartPLS's bootstrap re sampling techniques. It is interesting to note that all independent construct, intrinsic motivation (IM) and AITPACK (TP) indicated a significant relationship to cognitive readiness (CR). A positive correlation is found between TP and CR (0.525) and a IM and CR (0.222), at the significance level of 0.05. TP shows the strongest relationship with CR and indicates that the AITPACK have the most significant influence on teachers' cognitive readiness to use it. Therefore, these findings support H1 and H2. Next, the R^2 value of 0.633 for cognitive readiness indicates that the model explains 61% of the variance in the cognitive readiness to use AI. This shows that this model has a moderately strong explanatory power and is suitable for use in the field of assessing teachers' cognitive readiness regarding the use of new technologies

Table 2. Path Coefficient

Dependent variable	Independent Variable	Path	Observed *t*-statistics	*p*-value
Cognitive Readiness (CR), $R^2 = 0.633$	TP	0.525	2.828	0.005*
	IM	0.222	1.090	0.003*

CR= Cognitive Readiness; IM= Instrinsic Motivation; TP= AITPACK, sig level *(0.05).

Meanwhile, the results of the moderation analysis confirmed that, statistically, only the interaction between gender and AITPACK was significant ($\beta = 0.183$, $p = 0.013$). This finding confirms that the relationship between AITPACK and cognitive readiness is strengthened among male teachers. Therefore, only hypothesis H4 is accepted.

DISCUSSION AND CONCLUSION

Based on PLS SEM analysis, it was found that AI TPACK have the most significant influence on prospective steachers' cognitive readiness to use AI. The findings of this study are consistent with the findings of the studies of Ning et al. (2023) and Guan et al. (2023). In general, AI TPACK is an important element in increasing teachers' understanding in trying a new technology (Park & Son, 2022). This is because a high level of AI TPACK has a positive and significant impact in increasing the cognitive readiness of prospective teachers to use AI, even with only a minimal period of teaching experience (Fathi & Ebadi, 2020). Consistent with the findings of this study, Lee and Perret (2022) also affirmed AI TPACK as the most important knowledge component that forms the basic knowledge of intgerating AI among prospective teachers.

On the contrary, the findings also suggests a statistically significant but modest relationship between the intrinsic motivation and cognitive readiness. The findings of this study are in line with Tahiru (2021), which confirmed that teacher are ready to integrate AI when teachers are internally driven to explore and adapt. According to Gupta and Bashkar (2020), a high level of intrinsic motivation increases teachers' readiness to use AI. For moderation analysis, findings confirmed that gender only moderated the relationship between AI TPACK and cognitive readiness where the relationship was strengthened among male teachers. It was found that male teachers were more knowledgeable about modern technology and had more experience in using technology than female teachers (Rais & Rashid, 2023).

Overall, cognitive readiness to use AI among diploma education students can be increased if the AI TPACK and intrinsic motivation are strengthened especially among male students, from time to time. As suggested, the authorities, especially at the higher education institution level, plan a comprehensive program to strengthen AI TPACK and intrinsic motivation to use AI. Hence, universities are advised to provide excellent support to raise students' cognitive readiness towards AI integration. Indeed, AI cognitive readiness among prospective teachers is not just a casual issue but is about the future of inclusive, relevant and competitive education for our future generation.

Limitation and Future Research Directions

Since this model only explains 61% of the variance in cognitive readiness to use AI, future studies can be extended by changing or adding relevant study constructs. Furthermore, to enhance the strength of findings, a larger sample size is advisable. It is recommended to included diploma in education students from diverse university. This expanded sample size will facilitate the generalisation of results beyond what researchers initially reported in preliminary studies.

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