COGNITIVE STYLES ON STUDENTS' ACCEPTANCE OF ARTIFICIAL INTELLIGENCE-BASED TECHNOLOGY (CHATGPT AND KAHOOT!) FOR LANGUAGE LEARNING

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ABSTRACT

The rapid technology evolution has grown other new branches in artificial intelligence particularly chatbots and self-generated output. In order to enhance teaching and learning experiences, the education sector has decided to espouse these advancements for teacher's and student's support. Despite the benefits these AI tools attempt to provide, the perceptions towards these technologies vary individually. Therefore, this study's focal point is to determine the levels of AI-based technologies' acceptance, specifically ChatGPT 3.5 and Kahoot among secondary school students at SMK Takis Papar. Additionally, this study seeks to identify the influence of Kirton's Adaptive-Innovative cognitive styles on the process of decision-making regarding technology reception. Fifty students in Forms 1 and 3 at SMK Takis were given questionnaires as part of the data gathering process. In order to have a deeper understanding of secondary school students' opinions and preferences about ChatGPT and Kahoot integration in English language study, the responses were then analysed using SPSS version 28. By investigating the interconnection between cognitive styles and technology acceptance, this study attempts to propose valuable insights to policymakers, researchers, and educators involved in AI integration into secondary education settings.

Keywords: Artificial Intelligence, Education Technology, ChatGPT, Technology Acceptance, Cognitive Styles.

INTRODUCTION

Malaysia has constantly driven towards education development by embracing the advancement of technology and digitalisation and incorporating technology into teaching and learning. Our government has taken initiatives to execute digital intervention for learning as well as providing technological resources from allocating budgets for school facilities like computer labs, interactive smart boards, to internet infrastructures. However, on an implementation basis, there is an unspoken struggles faced by the teachers to utilise ICT into learning to allow positive response like learning motivation, interest, collaboration, cross-curricular skills, and content comprehension among students due to under-resourced school facilities and even some educators viewed digital implementation as time-consuming and extra workload (Ng & Yunus, 2021). In fact, Cancino and Ibarra (2023) supported that Kahoot, Socrative, Wordwall, Quizzizz, and Mentimeter that are called as online student response systems (OSRS) are regarded by most teachers as user-friendly as well as enhancing students' engagement.

On the other hand, aligned with the rocketing evolution of Industrial Revolution 4.0, Artificial Intelligence (AI) is now noticed to be implemented in the educational sector to accommodate the teaching and learning needs. AI digital tools like ChatGPT and upgraded interactive educational games like Kahoot and Quizizz are commonly used to assist learning and assess students' understanding towards particular contents of curriculum. On another extended facet of Technology Acceptance Model (TAM), These external

factors are frequently pitched to observe how they influence or trigger the cognitive responses (perceived ease of use and perceived usefulness) to form responses towards technology-using attitudes that eventually causes the acceptance or denial of the technology. Therefore, this study aims to ascertain two research questions.

i. What is the level of technology acceptance towards the AI-based technology which is ChatGPT and Kahoot! among ELL secondary school students?
ii. Do cognitive styles affect the acceptance of the AI-based technology of ChatGPT and Kahoot! for English language learning among Malaysian secondary school students?

LITERATURE REVIEW

Technologies Adoption in Language Learning

The hit of COVID19 was the starting point of mass implementation of technology in education and language learning was a part of it. This practice has been continued until post-COVID19. Research conducted by Mustafa et.al. (2020) illustrates that the adoption of Roblox application gained agreement from students that it could develop their critical thinking skills in writing by incorporating real-life issues, narratives, characters, and storyline in the writing activity using the application.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was first introduced by Darvis (1989) to illustrate the factors that anticipate the adoption of technology by potential users. The framework developed in this model contains major factors like perceived usefulness and perceived ease of use as indicators or determinants whether people are going to accept the technology for continuous use or not with the driven external factors as variables in the studies (Tella & Olasina, 2014).

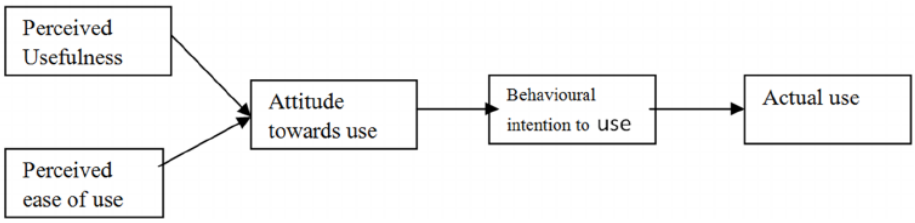

Figure 1: The Original Technology Acceptance Model (TAM) by Darvis (1989).

The pioneer version of Technology Acceptance Model (TAM) postulated that perceived usefulness (PU) and perceived ease of use (PEU) are the key factors to technology reception. In the education context, the previous study portrays these key determinants are translated into beliefs that using a technology tool can improve learning engagement. To define perceived ease of use, Burgess and Worthington (n.d.) describe PEU as the level of one's beliefs that the technology is easy to use. For students, this concept means that the digital learning tool that they are using is user-friendly with straightforward navigation to encourage engagement with course materials and communication features. These two factors—perceived usefulness and perceived ease of use—are crucial in shaping the behavioural attitude that leads to actual technology use. High scores in these factors increase the likelihood of technology adoption.

Technology Acceptance in Educational Settings

Many past research has emphasised the importance of assessing technology acceptance before its adoption. In the TAM model, Wicaksono & Maharani (2020) reported that perceived usefulness (PU) and perceived ease of use (PEU) were formed by the prior experience from using the technology which will

predict the future benefits of the same technology. Hong et. al. (2021) even highlighted the relevance of studying the technology acceptance level among preschool teachers that emerged during the hit of COVID-19 in China. Improvement in education engaged through the loops of feedback; receiving post-response by investigating technology suitability among students and teachers in the classroom setting beforehand allow teachers to make informed decisions by refining and improving technological tools based on real users' experience (Radif et.al. 2016). With some positive perceptions, a negative perception comes from a study conducted by Widianyingtias et al., (2023). It is related to the concerns about how AI like ChatGPT will deteriorate self-dependency, diminish critical thinking, and add academic integrity issues.

Introduction to Cognitive Styles

Garcia and Kennison (2013) define cognitive styles as preferences in thinking, perceiving, processing, and applying information which is different from the intellectual ability, but it is essential in making decisions, solving problems, and conceptual tempo. Understanding this one of individual differences is pivotal for educators, as it attempts to provide insights that would help shaping better learning experiences. In this current study, it aims to observe Kirton's A-I theory that classifies individuals on a spectrum from adaptive to innovative in problem solving. In this framework, it explains that innovators tend to challenge and reframe issues while adaptors only improve existing policies (Kirton, 1989; Kozhevnikov, 2007). Zhang and Sternberg (2006) stated that cognitive styles are malleable to factors like demographic, occupation, and culture. Stenberg and Zhang (2005) magnified the benefit of recognizing students' cognitive styles where it enables teachers to cater students with differentiated instruction and improving classroom performance. Other than that, Arifin et.al. (2020) reported that the way individuals absorb and retain information is largely influenced by cognitive styles. Therefore, addressing these differences can enhance learning outcomes.

Application of AI in Educational Settings

The benefits and drawbacks of AI were thoroughly investigated before it was integrated into the education sector. Al-Tkhayneh et. al. revealed that AI could positively improve learning experience, personalised education, and enhance teaching efficiency. However, some sceptics are concerned that AI might pose threats to learning development by deteriorating decision making skills, increasing overdependence, and encouraging laziness. Ahmad et. al. (2023) corroborated these concerns by investigating the impacts of AI on human loss in decision making, laziness, and safety in education among Chinese and Pakistani universities' students. A plethora of empirical studies have been done towards the impact of digital tools on students especially at the tertiary level and the results on the domains such as learning motivation, level of escalated skills, and technology acceptance are promising. Ali et. al. (2023) reported that utilising ChatGPT positively impacted students' learning, motivation, and autonomy. Additionally, Wang and Tahir (2020) also demonstrated a meta-analysis finding on Kahoot showing positive effects on learning performance, motivation, concentration, enjoyment, and perceived learning. However, other results in the same study portrayed that Kahoot can cause agitation and negatively affect classroom dynamics over time.

Effects of Kirton's Cognitive Styles on Learning

The impact of Kirton's study could be seen in the realm of education where it resonates with the methods of learning particularly in the learning approach. According to the constructivists, effective learning occurs when a problem-solving task is involved in a lesson to allow students to experience mental processing. "Learners are intellectually generative individuals rather than empty vessels waiting to be filled" (Yilmaz, 2008, p.162). Scott and Koch (2010) reported that the way students prefer to learn affects how they analyse, evaluate, and execute actions to solve problems. To reiterate, cognitive styles relate much to the preference of approaching problems and individuals learn better if they were given the liberty to choose their comfort method of learning. In the study conducted by Robinson et.al. (2010), each cognitive style has its own attributes to which it deals with the tasks. Adaptors have important advantages that help them solve problems and make decisions inside pre-existing frameworks. They can competently traverse and

apply current systems and processes because of their dedication to efficiency. Adaptors are frequently collaborators who thrive in cooperative settings where following set policies and procedures is essential. They are dependable and regular contributors because of their tendency for stability and risk aversion, especially in situations where upholding established procedures is essential.

Table 1: Adaptor and Innovator characteristics and behaviors
(Based on Kirton, 2000 (pg. 10-11) and 2003 (pg 53-55) and our classroom experiences).

Problem	Adaptor characteristics and behaviors:	Innovator characteristics and behaviors:
Risk	Adaptors appear to take fewer risks.	Innovators take greater risks.
Nature of solution	Adaptors produce consistent small wins. Adaptors are creative at solving problems within existing organizational rules and norms.	Innovators think in terms of creating the "big win". Innovators are less constrained by current organizational norms or conditions.
Solutions fit organization	Adaptors solutions may fit well with the organization's existing capabilities.	Solutions proposed by innovators may require more change in order to implement.
Defining the problem	Adaptors want to be efficient. They focus early and work to clarify the problem.	Innovators will redefine the problem to fit their understanding of the situation.
Problem scope and clarification	Adaptors ask questions to narrow the scope of the problem (e.g. "What do you really mean here?" "Is this how we should think about...?")	Innovators ask little clarification, ignore instructions, and prefer to answer the problem in the way they think it should be answered.

Figure 2: Characteristics of A-I cognitive styles by Robinson et.al. (2010).

In the same study, Robinson et.al. (2010) encapsulated that cognitive styles differences also bring conflicts towards problem-based learning since the tasks would consist of bias elements that support the characteristics of either adaptive or innovative individuals. People who have an intense preference for innovative cognitive styles may occasionally find it difficult to adapt to conventions or follow established processes. Their tendency to seek out nontraditional techniques may be viewed as a disadvantage in contexts where conformity is required, which might result in resistance or make it difficult for them to adjust to more conventional or rule-bound learning environments. People who have a strong adaptive cognitive style may find it challenging to adjust quickly to changes or to be willing to question accepted standards. Their inclination toward upholding traditional structures and practices may make it more difficult for them to accept creative alternatives or successfully traverse dynamic learning settings. This may be a drawback in situations when flexibility and a willingness to stray from the norm are needed.

Kirton's Cognitive Styles in Affecting Technology Acceptance

As debated earlier, cognitive styles are considered as individual differences that influence technology acceptance. Zamzuri and WanAdnan (2007) exhibited that cognitive styles do not significantly affect system adoption even though it initially affects perception of ease of use and usefulness. Ma et. al. (2006) also proposed the idea of different cognitive styles is a significant moderator that affects the extent of influence toward the final behavioural intention of using weblog systems. Another study by Zamzuri et.al. (2012) revealed that cognitive styles are the mediator that play a role in pitching the satisfaction of using e-platform, it also mentions that adaptive style individual influence the perceived ease of use of a system due to its adaptability nature and consequently lead to the higher usage of a system which indirectly signals satisfaction. By looking at the inconsistent findings of prior studies, it is uncertain to announce which cognitive style is adaptive or innovative that is more likely to adopt AI in education. Therefore, this study purposely aims to resolve these conflicting results by determining the level of acceptance of ChatGPT and Kahoot among secondary students at SMK Takis and identifying which cognitive style prefers using these AI-based educational tools for English learning.

METHODOLOGY

Research Design

The approach used in this study to obtain samples was through purposive sampling technique, which targeted on choosing 50 lower form students from Form 1 and Form 3 in SMK Takis, Papar, Sabah.

Instrument

This study utilised a questionnaire adapted from Saeed et. al. (2009) that was originally developed by Bagozzi and Foxall (1995) in order to figure out the samples' cognitive styles. Besides that, a questionnaire from Ghani et. al. (2019) was adapted and incorporated to assess the students' technology acceptance level. Merging both questionnaires enabled this current study to make identification of cognitive style categories and its impact on the technology acceptance.

Data Collection and Data Analysis

Initially, consent forms were distributed for the respondents to fill in to gain permission for data collection. A letter of permit to conduct a survey study is going to be submitted to the school principal to avoid the violation of laws and regulations. The questionnaires were handed out for the lower form students from SMK. Takis after accepting technology intervention during classes for 10 weeks. Before they record the response, they were given a briefing on how to answer the questionnaires. The collection of data was examined by using descriptive statistics from the Statistical Package for Social Sciences (SPSS) version 28 to accommodate the research questions of the study which are "What is the level of technology acceptance towards the AI-based technology of ChatGPT and Kahoot! among ESL secondary school students?" and "Do cognitive styles affect the acceptance of the AI-based technology of ChatGPT and Kahoot! for English language learning among Malaysian secondary school students?". Both research questions' data were assessed by percentage and frequency in SPSS system.

RESULTS/FINDINGS

Respondents' Background

There were 50 respondents in this study consisting of 34 female and 16 male students aged 13 and 15 years old selected from Form 1 and Form 3 lower form students in SMK Takis Papar that possess basic to intermediate English proficiency. These students learn English at school by using traditional methods, mainly textbooks and physical handouts, without the interference of technology. This method has been consistently applied since they were in primary school. Nevertheless, most of the respondents own their own smartphones and are technologically savvy. They also mentioned how technology accessibility at home helps them find similarities between ChatGPT and Kahoot with other applications like Siri and Quizziz.

Overview of The Technology Acceptance Among SMK. Takis Students.

Table 1: Level of Technology Acceptance Towards ChatGPT and Kahoot among SMK. Takis Students.

Frequency	Mean	Standard Deviation	Skewness
50	71.8	8.18990	-0.353

The survey included 50 respondents from Form 1 and Form 3. The mean technology acceptance score among these secondary school students is 71.8, indicating a relatively high level of acceptance towards ChatGPT and Kahoot. The standard deviation of 8.18660 shows some variability in acceptance levels, but the scores are not widely dispersed. This means that while most students have similar acceptance levels, there are some differences. The skewness value of -0.353 suggests a slight negative skew, indicating that

most students' scores are above the mean, with a few lower scores bringing the mean down. Overall, this shows that secondary school students are generally willing to incorporate ChatGPT and Kahoot into their English language learning. Therefore, the first hypothesis of the study is accepted: there is a significant difference in the level of technology acceptance towards ChatGPT and Kahoot among ESL secondary school students.

Overview of The Acceptance of ChatGPT and Kahoot! Between Adaptive and Innovative Cognitive Styles

Table 2: The level of ChatGPT and Kahoot Acceptance Between Adaptive and Innovative Cognitive Styles.

	Mean	**Standard Deviation**	**Skewness**
Adaptive Style	18.26	2.33701	0.337
Innovative Style	24.48	5.11596	0.337

The descriptive statistics show that students generally exhibit a higher level of innovative cognitive style compared to adaptive cognitive style, with a mean value of 24.48 versus 18.26. The greater standard deviation for innovative cognitive styles (5.11596) indicates more variability in scores. Both adaptive and innovative distributions are positively skewed (0.712 and 0.519), meaning most students scored below the mean, with a few higher scores.

Table 3: Technology Acceptance and Cognitive Styles Interconnection.

	Pearson Correlation (r)	**P-Value (p)**	**Interconnection**
Adaptive Style	0.309	0.029	Innovative Style
Adaptive Style	-0.137	0.0343	Technology Acceptance
Innovative Style	-0.259	0.070	Technology Acceptance

The Pearson correlation ($r = 0.309$, $p = 0.029$) shows a moderate, statistically significant positive relationship between adaptive and innovative cognitive styles. The correlation between adaptive cognitive style and technology acceptance ($r = -0.137$, $p = 0.0343$) is weak and not statistically significant. Additionally, the correlation between innovative cognitive style and technology acceptance ($r = -0.259$, $p = 0.070$) is weak and not statistically significant. Therefore, the non-significant p-values ($p > 0.05$) indicate no meaningful relationship between cognitive styles (adaptive and innovative) and technology acceptance.

Table 4: Model Summary.

Technology Acceptance (Dependent Variable)			
Cognitive Styles (Predictors)	**R Square**	**Adjusted R Square**	**Sig. F Change**
Adaptive, Innovative	0.071	0.031	0.179

The model summary shows that adaptive and innovative cognitive styles account for only 7.1% of the variance in technology acceptance, with an adjusted R Square of 3.1% considering the number of predictors. This indicates that cognitive styles explain only a small portion of the variability in technology acceptance.

Table 5: ANOVA Table.

Technology Acceptance (Dependent Variable)	
Cognitive Styles (Predictors)	**Sig.**
Adaptive, Innovative	0.179

The ANOVA table indicates that the overall regression model (0.179) is not statistically significant, as the significance value exceeds 0.05. This implies that the predictors, collectively, do not significantly predict the dependent variable, which is technology acceptance.

Table 6: Coefficient Table

Technology Acceptance (Dependent Variable)	
Cognitive Styles (Predictors)	**Sig.**
Adaptive	0.671
Innovative	0.112

The coefficient table indicates that neither adaptive cognitive style (p = 0.671) nor innovative cognitive style (p = 0.112) are significant predictors of technology acceptance. The p-values are greater than 0.05, suggesting that these cognitive styles do not have a statistically significant effect on students' acceptance of AI-based technology (ChatGPT and Kahoot).

DISCUSSION

Technology Acceptance Among SMK. Takis Students.

The survey with 50 purposive samples from Form 1 and Form 3 students at SMK. Takis Papar shows a significant difference in technology acceptance, as detailed in Table 4.5.6.1 of the Descriptive Statistics chapter. The mean score of 71.8 reflects a high level of acceptance of ChatGPT and Kahoot, indicating a positive attitude toward integrating these tools into English language learning. Students' perceived ease of use, perceived usefulness, and behavioural intention to use these AI tools also highlight high acceptance levels. The standard deviation score (8.18660) suggests that the acceptance levels among these students are partly diverse, the responses are not widely dispersed showing that most students share similar acceptance levels with minor differences. This finding aligns with studies by Ali et al. (2023), and Wang and Tahir (2020) that portrays the benefits of merging AI tools into learning. Other than that, the respondents perceive that AI technology like ChatGPT and Kahoot can give a positive impact to language learning.

The skewness value of -0.353 indicates a slight negative skewness, meaning most students' acceptance scores are above the mean, with a few lower scores. This suggests that while the majority of the students are highly accepting the tools, a small fraction might have lower acceptance levels due to factors like limited access to technology and differing levels of digital literacy, as presented by Rezaipandari et al. (2023). Overall, students at SMK Takis are generally accepting ChatGPT and Kahoot to be integrated into their English language learning as they firmly believe that these AI tools can attract their attention and facilitate vocabulary concepts understanding. Therefore, including AI-driven tools like ChatGPT and interactive platforms like Kahoot in language education could enhance learning outcomes and advance the Malaysian secondary school education system.

The Acceptance of ChatGPT and Kahoot! Between Adaptive and Innovative Cognitive Styles

The finding in the descriptive statistics table shows that the students' inclination is stronger towards innovative cognitive style as compared to adaptive. However, the scores display variability and positive skewness which indicate a wide range of responses that conclude the majority of the students prefer more than one cognitive style. This diversity can be regarded from the adolescent's confusion deciding their own cognitive preferences. In addition to that, higher mean scores in innovative cognitive style does not directly translate higher acceptance to ChatGPT and Kahoot since the Pearson correlation analysis reveals a moderate positive correlation between adaptive and innovative cognitive styles that show overlapping cognitive styles in some respondents. This overlap is normal for adolescents, who are still developing their preferences, as stated by Court (2013). These findings challenge existing literature that encapsulated cognitive styles influence technology reception, as prior studies like Ma et al. (2006), Zamzuri and Wan Adnan (2007), and Zamzuri et al. (2012) involved respondents over 18 who had more experience and clearer preferences.

It is noted that the correlations between cognitive styles and technology acceptance is weak and non-significant scoring only 0.671 and 0.112 for both Adaptive and Innovative styles, highlighting indications that cognitive style alone does not entirely predict one's acceptance towards AI-tools for learning. Therefore, this finding is on a parallel line with a study carried out by Zamzuri and Wan Adnan (2007) that reported cognitive styles do not significantly lead to the system utilisation although it affects the perceptions of usefulness and ease of use. In other words, cognitive style is not a primary key determinant for ChatGPT and Kahoot acceptance in English language learning among secondary school students even though in can affect the decision to adopt or decline the technology as mentioned by Saeed et al. (2009). To strengthen the previous statement, the tabulation data from model summary and ANOVA results exhibit that cognitive styles score with just 7.1% which is only a small subset of the variance in technology acceptance indicating its non-significant correlation. This result confirms that the cognitive styles do not directly predict technology acceptance although it has a small influence in the determination. Even the coefficient table displays that neither both cognitive styles significantly predict technology acceptance and this supports the earlier findings from both descriptive and correlational analyses from this current study.

Implication of the Study

This current research has postulated that the factors which significantly influence students' acceptance towards AI educational technologies are beyond cognitive styles. One of the key determinants is technological literacy. In spite of that, this study also exposes the importance of prior exposure to technology. When the students are familiar with the educational technology, it is much easier for them to accept the new AI-based tools into learning since their confidence is boosted. On a higher level, the government should gradually and seamlessly insert technology integration into the curriculum. Encouragement on early exposure and engagement to educational technologies among students can escalate their confidence and lessen anxiety towards new AI tools. To conclude, while cognitive styles is the central idea of this study, it is advisable not to forget other factors like technology literacy, prior exposure, effective teaching methodology, and perceived usefulness as well as perceived ease of use also share their importance contributing to the students' technology acceptance. Addressing these factors can help create more effective and engaging learning environments with AI-based educational technologies.

Recommendations for Future Research

It is recommended that upcoming research in this area should pay close attention to long-term studies that monitor the technological literacy evolution over time. The relevance of this suggestion is it enables critical phases identification for impactful intervention as well as understanding the influences of prolonged exposure to these technologies on its acceptance if the students' technology familiarity progression is analysed. Another important area is the impact of different technology experiences on students' adoption of AI-based teaching aids. Researchers should explore how exposure to various educational technologies affects students' readiness and adaptability to new tools. This can determine if familiarity with one technology enhances acceptance of another. Future research is suggested to conduct study on the way cultural settings, financial backgrounds, and academic environments affect learners' attitudes and their intentional use of AI-based education resources. Moreover, comparative studies that encompass diverse educational systems and regions can expose how these factors influence technology acceptance and determine best practices for adaptation. Nevertheless, the acceptance of technology among students like ChatGPT is influenced by peer decisions, perceived usefulness, innovation, and usage satisfaction as mentioned earlier in the recent study. Therefore, these factors can be investigated for future research to figure out its influence on technology adoption.

CONCLUSION

This study investigated the acceptance of AI-based educational technology tools, specifically ChatGPT and Kahoot among ESL secondary school students in SMK Takis, Papar. On an important note, cognitive styles

are measured to see the influence it gives on the acceptance level by using a descriptive quantitative approach. Based on the findings, the study reveals that students show a high acceptance of ChatGPT and Kahoot into their English language learning with the majority of them recognising the benefits and ease of use of these tools. Although some feedback indicated some variability due certain factors like limited access and differed digital literacy, the general acceptance was positive suggesting that AI tools could improve learning outcomes if integrated into language learning. The central finding of this study showed that cognitive styles are not a primary indicator that affect technology acceptance. Instead, other key determinants like technological literacy, prior exposure to technology, effective teaching methods, and the perceived usefulness as well as ease of use of AI tools share important roles in ascertaining the acceptance of technology. By addressing these factors, it can assist both educators and developers to facilitate learning by considering these AI tools to be integrated into language lessons which ultimately improve student learning outcomes.

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