A Review on Acceptance of Chatbots for Learning: Malaysian Context

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ABSTRACT

This review explores the acceptance of chatbots- an increasingly prominent application of artificial intelligence (AI) in teaching and learning processes at higher education levels in Malaysia. Chatbots, powered by AI, have become integral tools and are widely used across various fields, including healthcare, finance, retail, and customer service, but are least known in the education sector. Their adoption in education remains limited, primarily confined to basic administrative tasks only. Despite their potential to revolutionize education, chatbots' implementation is still largely experimental and not explicitly addressed in pedagogy and learning, for it is still in its infancy. This study synthesizes findings from selected articles to explore students' acceptance levels of chatbots, both theoretical and practical, across different educational fields. The analysis identifies key themes influencing chatbot adoption, including perceived usefulness/performance expectancy, perceived ease of use/effort expectancy, adoption intention/behavioural intention, scaffolding/learning support, social influence, habit formation/engagement, trust and ethics, and design and interactivity. Findings reveal that perceived usefulness and ease of use are significant predictors of students' acceptance, while factors such as social influence, trust, and ethics play supporting roles. By offering personalized responses, enhancing students' engagement, and cultivating academic success, chatbots are acknowledged for their capacity to improve students' learning experiences. However, trust, ethics, and design-related issues remain underexplored. Clear guidelines and policies on appropriate chatbot usage must be established by educational institutions to ensure academic integrity while leveraging this technology to support effective learning. This review concludes that a complex interaction of technical, social, and ethical factors influenced the chatbot's acceptance in Malaysia. Academicians and higher education institutions can maximize chatbots' capacity and potential to revolutionize learning within the Malaysian higher education sector by taking these factors into account.

Keywords: Artificial Intelligence, Chatbots, Chatbots acceptance, Chatbots for learning

INTRODUCTION

Artificial Intelligence

The New International Webster's Comprehensive Dictionary of the English Language, Encyclopedic Edition, has defined artificial intelligence (AI) as a computer science field concerned with developing computers and machines capable of engaging in human-like cognitive functions, such as learning, reasoning, adapting, and self-correction (Kok et al., 2002). Due to the rapid developments, the definition of AI has also changed in the course of time. A more recent definition of AI is a subfield of computer science focusing on designing systems that imitate intelligent human behaviour with computer programs, which include not only learning and autonomy in reasoning (Chaudhary et al., 2024; Maurya et al., 2024), but also problem-solving, contextual understanding, adaptability, and inference (Triantafyllou, 2024). To develop fully intelligent systems, AI is designed to reproduce and mimic human intelligence by integrating natural language processing (NLP) (Mishra & Kumar,

2020), automated reasoning, knowledge representation (Dadure et al., 2023), and machine learning criteria (Gupta et al., 2024).

In today's world of digital technology, AI has emerged as a transformative tool across diverse industries, including healthcare, retail, financial services (Maurya et al., 2024), manufacturing, transportation (Chinimilli & Sadasivuni, 2024), agriculture, and education (Kulkarni, 2024). AI's flexibility enables it to be tailored to fulfill the demands of various industries. For example, in the healthcare industry, AI improves clinical diagnostics not only through medical image analysis (Sharma, 2024), but also by predicting patients' outcomes using data-driven models (Borra, 2024). Likewise, AI-driven tools such as virtual assistants like Siri and self-driving vehicles demonstrate advanced potential, such as voice recognition and traffic control (Shabbir & Anwer, 2018).

In line with the rapid evolution of digital technology, AI is reshaping the education industry. By offering individualized learning support, supplementing both teaching and learning activities, and automating routine administrative work, AI is creating a crucial and significant impact in classroom settings. For example, AI applications can streamline various administrative tasks such as class scheduling, assessment grading (Sagar & Saini, 2025), and record keeping (Pancholi et al., 2025). This enables educators to focus more on instruction and student engagement. These transformations allow educators to devote more time and attention to what matters most: monitoring and mentoring students as well as providing the best quality education.

AI's potential and capacity extend beyond administrative task optimization. Through integration of AI with digital technologies such as virtual reality (VR) and augmented reality (AR), more interactive and engaging learning experiences can be provided to learners (Wang & Huang, 2025). This helps to bring courses like history and science to life with real-time, immersive simulations (Barbara, 2022; Poveda-Mora et al., 2024). Educators are also provided with data-driven insights, assisting them in identifying weak students and refining their teaching-learning strategies appropriately (Alsbou & Alsaraireh, 2024), making sure that every student receives the vital learning support they need accordingly. This personalized, data-centric approach provides more individualized and productive, quality education, addressing individual students' strengths and weaknesses.

In addition to transforming how students learn nowadays, the AI integration in the education industry is also redefining educators' responsibilities. Increased collaboration of educators with AI leverages its potential to improve individualized learning and close educational gaps. Various AI-powered applications provide not only intelligent tutoring systems but also adaptive learning and testing and real-time feedback (Nampelli, 2025), enabling personalized learning at a scale unattainable by a single instructor overseeing a huge classroom. For instance, generative AI tools such as ChatGPT enable educators to customize class lesson plans and practice exercises promptly, freeing up their valuable time for student engagement (Stognieva, 2024). This collaboration between educators and AI exemplifies how technology can augment the traditional pedagogy approach rather than replacing it. While educators offer vital emotional intelligence and contextualized understanding to the classroom, AI excels at analyzing vast amounts of data and consistently providing individualized feedback. To optimize these benefits, modern educators must be equipped with professional development and AI literacy that enables them to integrate AI-driven tools efficiently and, most importantly, ethically into their teaching practices.

Among numerous AI-powered applications in the education industry, AI has made significant advancements in the language acquisition domain. For instance, applications like Duolingo employ algorithms to assist learners in practicing reading, listening, and writing through repetitive and adaptive exercises (Bicknell et al., 2023). Despite these advancements, such applications have several limitations. For example, Duolingo does not retain previous lessons' memory (Bicknell et al., 2023) and is ineffective in improving learners' vocabulary and short-term grammar retention (Sholikhah, 2025).

Shawar and Atwell (2007) highlight the crucial role of educators in the careful incorporation of AI in education, emphasizing that learners must be equipped with knowledge about AI's functions, advantages, and limitations. AI should be utilized to augment teaching pedagogy by promoting critical and creative thinking skills, rather than replacing the conventional approaches. Following the rapid advancement of AI, learners must adapt to its fast-growing nature, not only in education sectors but also across different industries. This is to align with the

visions of Industry 5.0 and Society 5.0, which advocate for human-centered technological evolutions. Eventually, AI serves as a supplementary tool that improves education while equipping students for a future where human and digital technology coexist harmoniously.

Outside of the classroom setting, AI often offers personalized tutoring and advanced academic support, which significantly improves students' learning outcomes in complex courses like mathematics and science (Leong, 2024). Instructional tutors and AI assistants assist educators by customizing content based on students' learning styles, summarizing text for swift information synthesis, generating quizzes for adaptive learning, and scheduling algorithms for robust time management (Sornavalli et al., 2024), further freeing up educators to devote more time to personalized instructions. These advancements are transforming education to be more responsive, flexible, and inclusive than ever before. While AI encompasses a wide range of applications, one explicitly promising domain within the education sector is the use of chatbots, which leverage AI to facilitate personalized and interactive learning experiences.

Chatbots

A chatbot is a computer program developed to interact with humans and stimulate conversation through text or voice communication (Dhananjaya et al., 2024). Typically driven by AI, chatbots are tailored to comprehend input by users and provide appropriate responses (Bishop, 2023). The term 'chatbot' encompasses related concepts such as conversational agents, conversational systems, and pedagogical agents (or Intelligent Pedagogical Agents, IPA) (Roos, 2018). Initially developed for simple tasks such as mimicking conversations or providing customer support, chatbots have evolved to serve diverse functions across industries like healthcare, marketing, support systems, and education. In education typically, chatbots enhance learning experiences by streamlining administrative tasks and providing personalized support for students and educators. Their applications include teaching and learning activities, students' assessments, administrative tasks, advisory and mentoring services, and research (Okonkwo & Ade-Ibijola, 2021). In teaching contexts, chatbots act as virtual tutors by offering instant access to information and interactive lessons that facilitate self-paced learning. For example, language-learning chatbots allow students to practice reading and conversational skills in real time. Administratively, chatbots automate processes such as enrollment inquiries and scheduling while improving communication efficiency within institutions. For assessments, they provide quizzes with personalized feedback to help students identify areas for improvement. Chatbots also serve as advisory tools by guiding students on course selection or career planning based on individual preferences and performance data. Additionally, in research settings, chatbots assist by collecting data and analyzing trends.

Despite their many benefits in education, such as enhancing engagement through personalized learning experiences, chatbots also present challenges. Data privacy issues, evaluation issues, user attitude issues, and ethical considerations regarding their use in education systems are among the concerns raised. There is also a need for ongoing monitoring to ensure accuracy and reliability of information provided by these systems; thus, implementation of chatbots in education requires proper supervision and maintenance. To maximize their potential while addressing these risks effectively requires alignment with human-centered values that promote collaboration between humans and AI (Okonkwo & Ade-Ibijola, 2021).

Chatbots integration in Malaysian education system

Malaysia is among the countries that actively contribute to chatbot education research in the Asia-Pacific region, reflecting the increasing awareness and use of AI-driven teaching tools (Nee et al., 2023). However, the integration of chatbots into the Malaysian education system still lags far behind its use in customer service and business purposes. Chatbots are widely accepted in the service sector, such as government public services, and are used as a fast and effective communication platform between sellers and buyers for online business transactions.

Several countries have integrated chatbots and AI-powered systems into their education sectors, such as Singapore, South Korea, Finland, India, the United States, and China. However, their chatbot use is more to promote student engagement, support metacognitive, collaborative, and affective learning, and reduce learning stress. The Pounce chatbot at Georgia State University was designed to help students, such as by reminding them

about their assignments, tests, and exams. It also helps students with academic support and course content (Tsoi & Strønen, 2024). According to a 2023 study, chatbots have been utilized only by private universities in Malaysia, primarily for administrative tasks such as managing inquiries and providing information through their websites (C W Ahmad et al., 2023). The use of chatbots mainly for teaching and learning purposes in Malaysia remains limited and still at its early stages. This limited adoption highlights the untapped potential of chatbots in enhancing teaching and learning experiences within Malaysian educational institutions.

METHODOLOGY

Planning

In general, the use of chatbots for teaching and learning has been widely accepted. However, for the Malaysian context, specific chatbot applications for this purpose are still in their early stages. Several studies have proposed and developed chatbot systems to support the learning process. It is therefore imperative to provide the reader with a wide range of knowledge on the applications of chatbots in the Malaysian education system, including the general view of students accepting chatbots as one of their learning mediums and students' acceptance of chatbots that are ready to be used in learning.

In conducting this review, inclusion and exclusion criteria were applied to ensure the selection of relevant and focused studies. Prior research recommends that articles should be selected based on clear inclusion and exclusion requirements. For this review, the inclusion criteria were as follows: studies published in English; articles focused solely on teaching and learning within the Malaysian context; publications dated before August 2024; and only full-text journal and conference articles were considered. Conversely, the exclusion criteria included removing duplicate studies, papers focusing primarily on the design and development of chatbots rather than their educational application, and studies broadly addressing AI without specific emphasis on chatbot use in education.

To identify pertinent literature, searches were conducted across several digital databases, including ScienceDirect, SpringerLink, and Google Scholar. Three primary combinations of keywords that were validated through prior research on chatbot applications in education- “Chatbots for education in Malaysia,” “Chatbots for teaching and learning in Malaysia,” and “Chatbots acceptance in Malaysia”-, were employed. Both manual and automatic search methods were applied. We integrated three techniques in our manual search: handpicking related studies, backward tracking of references cited in selected articles, and forward tracking of subsequent studies citing those articles. These systematic approaches ensure a thorough overview and a comprehensive evaluation of the recent state and chatbot acceptance as a learning tool among students in Malaysia. This can provide a strong foundation for further chatbot innovation and incorporation in Malaysian educational settings.

After employing the pre-defined inclusion and exclusion criteria, only 10 articles were chosen for our final review. These research studies represented a range of chatbot types, research methodologies, and theoretical frameworks utilized to evaluate chatbot applications in the Malaysian education landscape. The sample sizes of these research studies varied, ranging from small groups of 40 participants to larger populations of more than 600 students, indicating diverse research contexts and scopes.

Quantitative surveys were the predominant methodological approach among the 10 chosen research studies. This highlighted a solid focus on measuring students' acceptance, students' perceptions, and students' interactions with chatbots through statistical analyses. Mixed methods approaches were also notable, which combined quantitative surveys with qualitative data gathered from interviews and open-ended questions to provide valuable insight into learners' attitudes and experiences.

Diverse types of chatbots were utilized across the studies, including commercially accessible platforms such as ChatGPT and educational applications like Duolingo and Mondly. Locally developed chatbot applications, namely MERLIN, eLVA, and IHAB, were also included. This diversity of chatbot types highlights the rapidly evolving chatbot technology deployed in Malaysian educational settings, from broadly available AI-driven tools to specialized chatbots in education. Various theoretical models were applied in many studies, including the Unified Theory of Acceptance and Use of Technology (UTAUT and UTAUT 2) and the Technology Acceptance

Model (TAM), reflecting a strong emphasis on comprehending factors influencing chatbots' acceptance and students' intention to utilize chatbots in learning.

All in all, the chosen studies provided richer insights into the recent state of Malaysian students' chatbot acceptance, indicating both the strengths and the challenges faced in incorporating chatbots into Malaysian educational contexts. This review provides a foundation for future research aimed at optimizing chatbot design and implementation to better engage learners and support teaching outcomes. The 10 articles selected for the final review are summarized in Table 1.

Table 1: Descriptive information about the chosen chatbot studies.

Author	**Year**	**Sample of Study**	**Methodological Approach**	**Research Method(s) Used**	**Chatbots Used**	**Theory / Model Used**
Saforrudin et al. (2024)	2024	303 students	Quantitative	Survey, Statistical analysis	-	Unified Theory of Acceptance and Used Theory (UTAUT)
Yahaya et al. (2024)	2024	376 students	Quantitative	Survey, Statistical analysis	-	Technology Acceptance Model (TAM)
Adams et al. (2023)	2023	373 students	Mixed Methods	Survey, open-ended questions, statistical analysis, qualitative analysis	ChatGPT	-
Annamalai et al. (2023)	2023	360 students	Mixed Methods	Questionnaire survey, Interviews	Duolingo, Mondly, Andy, Memrise	The Push-Pull Mooring Habit Theory (PPMH)
Foroughi et al. (2023)	2023	406 students	Mixed Methods	Survey, PLS-SEM, fsQCA	ChatGPT-3.5 version	Unified Theory of Acceptance and Used Theory 2 (UTAUT2)
Keong (2022)	2022	624 students	Quantitative	Survey, Statistical analysis	-	Technology Acceptance Model (TAM)
Neo (2022)	2022	62 students	Mixed Methods	Survey, open-ended questionnaire	MERLIN	Technology Acceptance Model (TAM)
Rahim et al. (2022)	2022	300 students	Quantitative	Survey, SEM-ANN (Structural Equation Modeling - Artificial Neural Network)	-	Unified Theory of Acceptance and Used Theory 2 (UTAUT2)
Jambli et al. (2021)	2021	40 students	Quantitative	Experiment, Survey	eLVA	-
Mohamed Mokmin & Ibrahim (2021)	2021	75 students	Mixed Methods	Semi-structured interviews, Google Analytics data analysis, UTAUT2 questionnaire	IHAB	Unified Theory of Acceptance and Used Theory 2 (UTAUT2)

RESULTS AND DISCUSSIONS

Theme-based results

The results presented are based on a comprehensive review of existing studies on chatbot acceptance for learning purposes within the Malaysian higher education context. While the majority of studies focused on technical implementation and students' perceptions, relatively few studies explored the long-term impact or the holistic integration of chatbots into the curriculum. Consequently, the results of this literature review have been grouped into the following key themes: Perceived Usefulness/Performance Expectancy, Perceived Ease of Use/Effort Expectancy, Adoption Intention/Behavioural Intention, Scaffolding/Learning Support, Social Influence, Habit Formation/Engagement, Trust & Ethics, and Design & Interactivity. These themes were derived from the research questions, the variables examined, and the overall focus of the reviewed studies.

Perceived Usefulness/Performance Expectancy: Perceived usefulness, originating from the TAM developed by Fred Davis in 1986 and formalized in 1989, reflects an individual's belief that a technology will enhance their effectiveness or productivity in task performance. This foundational concept directly influenced the development of performance expectancy, a core construct in the UTAUT. UTAUT synthesizes perceived usefulness with seven other models, expanding it to include contextual factors like job relevance, social influence, and outcome expectations. While perceived usefulness concentrates on individual task-specific advantages, performance expectancy broadens this perspective to encompass systemic gains, bridging personal utility with drivers of organizational and social adoption.

Perceived usefulness and performance expectancy represent key themes in understanding the acceptance of chatbots for learning within the Malaysian context. Students believe that using chatbots is helping them to enhance their learning results, improve their academic performance, and ultimately help them in achieving their educational purposes. Across several studies, this factor emerges as a significant predictor of students' intentions to use chatbots (Yahaya et al., 2024; Keong, 2022; Mohd Rahim et al., 2022; Saforrudin et al., 2024). For instance, Yahaya et al. (2024) found that perceived usefulness held the highest significance value in students' acceptance of AI chatbots for virtual collaborative learning. These findings are in line with those of Keong (2022), which state that the more useful a chatbot is perceived to be, the more likely students are to use it as a learning tool. Similarly, Mohd Rahim et al. (2022) demonstrated that performance expectancy significantly influences behavioral intention towards using chatbot applications in higher education institutions. Meanwhile, Mohamed Mokmin & Ibrahim (2021) found that the IHAB chatbot was generally perceived as useful for understanding health issues and providing good conversations, exhibited a low exit rate, and has significant potential to increase health literacy among students, further underscoring the importance of perceived usefulness in chatbot acceptance. Annamalai et al. (2023) also supported that performance expectancies contribute to the positive experience of using chatbots for language learning. Furthermore, both Neo et al. (2022b) and Adams et al. (2023) noted its ability to augment the learning experience and highlight the direct benefits for learning. In a separate study, Neo (2022a)- although not part of the primary review set, directly confirmed this, reporting that students found the Merlin chatbot improved their understanding and was helpful in the learning process. In essence, students are more inclined to embrace chatbots when they are convinced that these technologies can demonstrably improve their learning experiences and academic success.

Perceived Ease of Use/Effort Expectancy: Perceived ease of use, defined by Fred Davis (1989) as 'the degree to which a person believes that using a system would be free from effort', is a foundational component of the TAM, which builds on the Theory of Reasoned Action (TRA). An individual's cognitive evaluations of an effort, directly shaping technology adoption through its influence on perceived usefulness and behavioral intention, are emphasized by this construct. Effort expectancy, conceptualized in the UTAUT by Venkatesh et al. (2003), refines this concept by placing ease of use within a broader framework of social and contextual factors. Perceived ease of use emphasizes internal user beliefs, whereas effort expectancy integrates external factors such as age, experience, and facilitating conditions, thereby serving as a more comprehensive predictor of adoption across diverse settings. The combination of these elements forms a continuum: perceived ease of use anchors the cognitive foundation of user acceptance, while effort expectancy expands it to tackle real-world complexities. It also ensures technologies align with both human psychology and systemic design principles.

Perceived ease of use and effort expectancy represent a crucial factor affecting the acceptance of chatbots for learning within the Malaysian context. This theme encompasses students' views on the ease of engaging with chatbots and the amount of effort required for effective usage. The simpler the chatbot is to use, the more likely students are to utilize it. Students are generally more willing to adopt technologies they find user-friendly and demand little effort to manage (Mohd Rahim et al., 2022; Saforrudin et al., 2024; Yahaya et al., 2024). Yahaya et al. (2024) and Saforrudin et al. (2024) support that perceived ease of use is a key factor for students to accept AI-based chatbots. Basically, students are more likely to accept chatbots when they are confident that these technologies are user-friendly.

Adoption Intention/Behavioral Intention: Adoption intention and behavioral intention are often used interchangeably to describe the same concept: a person's conscious plan or willingness to use a technology in the future. Both terms emphasize intention as the immediate antecedent of behavior and are central constructs in technology acceptance models and are strong predictors of actual usage behavior. They stem from behavioral theories such as the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB).

Adoption intention and behavioral intention are crucial concepts for evaluating the success of chatbot integration in Malaysian higher education. This construct refers to the extent to which students are open to adopting, or have already embraced, chatbots as a resource in their educational journey. Numerous studies have directly investigated the factors influencing this intention, revealing that perceived usefulness and ease of use, along with other variables, contribute significantly (Keong, 2022; Mohd Rahim et al., 2022; Saforrudin et al., 2024). Furthermore, Adams et al. (2023) showed that students have the willingness to use ChatGPT, with a large majority attesting to its ability to enhance their learning experience. Similarly, Jambli et al. (2021) discovered that students had the intention to adopt chatbots as a learning medium. Therefore, the intention to use chatbots is a key indicator of whether these technologies will be successfully integrated into higher education in Malaysia.

Scaffolding/Learning Support: Scaffolding, a foundational pedagogical approach rooted in Vygotsky's sociocultural theory and refined by Jerome Bruner, provides structured, temporary support to enable learners to achieve independent mastery within their zone of proximal development (ZPD). Personalized support, enhancing engagement and independence, is provided by strategies such as modeling and guided practice. This idea directly contributes to the broader framework of learning support, which extends scaffolding's principles to tackle not only academic difficulties but also social, emotional, and physical obstacles. Learning support integrates scaffolding's emphasis on adaptive assistance with inclusive methods- such as differentiated instruction, counseling, and assistive technologies, to ensure equitable access to education.

The scaffolding and learning support refer to the use of chatbots to give personalized support and encouragement. This theme plays a crucial role in the context of chatbot integration in Malaysian education, as it highlights how such technologies can support and guide students throughout their learning journeys. This theme includes the different methods by which chatbots offer support, tailored feedback, and direction to learners, serving as a digital support structure. Neo et al. (2022) demonstrated that a chatbot is able to motivate students to learn more and improve their understanding of course material, while Jambli et al. (2021) showed that chatbots can provide answers to students.

Social Influence: Social influence comprises the ways in which individuals adjust their thoughts, feelings, or behavior to meet the demands of a social environment. This theory suggests that people are motivated to conform to the expectations of others, especially when they perceive that those expectations are widely shared. In technology adoption, it specifically denotes the degree to which an individual believes that significant others, such as peers and administrators, think they should use a new technology, as defined by frameworks like UTAUT. In education, technology adoption, classroom interactions, and learning results are determined by social influence, as highlighted by UTAUT and Albert Bandura's Social Learning Theory (SLT).

Social influence plays a notable, though perhaps less prominent, role in shaping students' acceptance and adoption of chatbots for learning. This theme acknowledges that students' decisions to use chatbots can be influenced by the perceptions, opinions, and recommendations of their peers, instructors, or social circles. In this review, social influence is addressed by Annamalai et al. (2023) and Foroughi et al. (2023). Specifically,

Annamalai et al. (2023) highlighted the importance of the influence on students' intention to use chatbots as a learning tool. Also, Foroughi et al. (2023) identified that the influence of other parties would influence the students' intention to adopt AI-based chatbots for learning. Therefore, creating a positive social environment and fostering peer support can contribute to greater acceptance and utilization of chatbots among students in Malaysian educational settings.

Habit Formation/Engagement: Habit formation and engagement are critical yet evolving concepts in technology acceptance research, bridging intentional behavior and automatic usage patterns. Habit refers to automatic behaviors triggered by environmental cues or internal states, reducing reliance on conscious decision-making. It is a settled tendency or usual manner of behavior that has become nearly or completely involuntary. On the other hand, engagement reflects sustained interaction, involvement, and connection with a technology, driven by perceived value, usability, and emotional connection. More precisely, the term 'technology engagement' could be conceptualized as a state of focused immersion and deep engagement with a highly enjoyable experience that takes place when the individual is interacting with any technology with full immersion (Agarwal & Karahanna, 2000).

Habit formation and engagement, while distinct, collectively influence sustained chatbot usage in education. Habit formation refers to students' development of automated routines in using chatbots, whereas engagement reflects their ongoing interaction driven by perceived value. While less studied than core TAM constructs like perceived usefulness, these factors are critical in the Malaysian context, where Annamalai et al. (2023) and Mohd Rahim et al. (2022) highlight their role in transitioning from initial adoption to long-term use. Habit is recognized by UTAUT2 as a direct predictor of sustained use, independent of initial adoption factors, while self-determination theory emphasizes intrinsic motivation as the driving force behind engagement. Fostering both habit and engagement is essential for realizing chatbots' potential as learning tools.

Trust and Ethics: Trust and ethics emerge as interdependent drivers in the acceptance and use of sustainable educational technologies like chatbots, especially within the Malaysian context. Trust reflects students' belief that chatbots are trustworthy and capable of delivering accurate data to them. Furthermore, students have the right to feel safe and comfortable with the belief that chatbots will not 'betray' them. Ethics, on the other hand, ensures that these systems align with societal values, reducing barriers to adoption.

The Ministry of Education Malaysia (KPM) has placed significant emphasis on the inculcation of noble values within the national education system, recognizing that ethical principles are fundamental in preparing students to face the challenges of the 21st century. This educational transformation, in line with the Malaysia Education Blueprint 2013-2025, underscores the cultivation of universal noble values such as integrity, compassion, justice, and altruism. These values not only guide students in making ethical decisions, but also form the framework through which knowledge is conveyed. They need to be instilled from the beginning so that students do not get too excited about the process of obtaining data quickly and easily, thereby marginalizing ethical values. Guidelines for the use of chatbots in the learning process can be applied earlier in secondary education institutions in Malaysia. Among the guidelines is ensuring that the information received is reviewed in terms of the accuracy and validity of the information source. Students need to be taught not to rely too much on information from chatbots, but rather that they still have external sources that can be used to obtain additional information needed. The principle of student ethics begins with the system through which students receive their knowledge. To produce ethical students, students need to be 'shown' and believe that what they achieve also comes from ethical sources (Kementerian Pendidikan Malaysia, 2023).

Although less frequently emphasized than other factors, trust and ethics are critical in fostering responsible integration of chatbots for learning. Mohd Rahim et al. (2022) highlight the importance of ensuring that chatbots stick to best practices, confirming the need for developers and educational institutions to prioritize trust-building and ethical guidelines. By doing so, they can create a positive and responsible learning environment that mirrors the noble values championed by KPM and supports students' holistic development.

Design and Interactivity: Design and interactivity serve as critical yet understudied pillars in technology acceptance, bridging system functionality with user experience. Effective chatbot design, which is based on

interaction design principles, places a high value on user-centered aesthetics, simple navigation, and prompt feedback in order to meet the cognitive and behavioral needs of students. These components are important in determining how students use chatbots for learning in Malaysia, despite not being as thoroughly researched as other factors. In line with TAM's emphasis on perceived ease of use and usefulness, this theme focuses on the importance of developing chatbots that are visually appealing, user-friendly, and capable of engaging students in meaningful interactions. Only Mohd Rahim et al. (2022) have addressed the importance of such designs in Malaysian education. In order to improve engagement and promote a pleasant learning environment, institutions should give priority to conversational user interfaces, individualized feedback, and gamified aspects. This is in line with best practices in interactive simulations and user-centered design.

CONCLUSION

This review synthesizes findings from studies investigating the acceptance and use of chatbots for learning within the Malaysian context. According to the studied literature, Malaysian students have a generally positive opinion of chatbots as educational aids, emphasizing how they can improve online learning environments. In summary, the use of chatbots for education in Malaysia is a complex situation driven by a complex interaction of ethical, social, and technical issues. Teachers and institutions can use chatbots to improve Malaysian students' educational experiences by addressing the main factors that influence adoption, investigating new issues, and filling in the gaps in the literature.

Suggestion For Future Research

Future studies should concentrate on the areas of design, ethics, trust, and interaction. This is due to the fact that the growing usage of chatbots in academia brings up significant issues regarding the lines separating academic dishonesty from moral learning assistance. Chatbots can improve comprehension by giving explanations, coming up with ideas, and giving comments, but they can also be abused by copying generated information without giving credit. The difference is in how students use these tools: utilizing them to create duplicated work is plagiarism, while using them to support independent work and critical thinking is ethical learning.

To make sure that these tools support rather than contradict educational objectives, academic institutions must also set explicit criteria for the ethical use of chatbots in teaching and learning. The fundamental goals of higher education- critical thinking, problem-solving, and independent learning, must not be replaced by chatbots, even though they can facilitate individualized instruction, offer immediate feedback, and expedite administrative duties. Policies should guide students and instructors on when and how chatbot assistance is appropriate, emphasizing ethical use, openness, and the value of academic integrity. Universities may take advantage of AI's advantages in this way while maintaining education's core goal of fostering knowledge, creativity, and intellectual development.

To make sure that chatbots are created in a way that promotes moral learning while lowering the possibility of academic dishonesty, more research on design and interaction is essential. Instead of having users passively accept generated responses, an effective chatbot design should stimulate critical thinking and active involvement. Instead of just copying information, interactive elements like guided questioning, real-time feedback, and adaptive learning pathways can assist students in creating original ideas. Furthermore, research on interactivity can investigate the effects of various user interfaces and engagement strategies on ethical behavior and learning outcomes. Future studies can assist in developing tools that improve learning without compromising academic integrity by honing chatbot design to conform to best standards in education.

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