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The use of ChatGPT in the digital era: Perspectives on chatbot implementation

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Abstract

The rapid advancement of technology has led to the integration of ChatGPT, an artificial intelligence (AI)-powered chatbot, in various sectors, including education. This research aims to explore the perceptions of educators and students on the use of ChatGPT in education during the digital era. This study adopted a qualitative research approach, using in-depth interviews to gather data. A purposive sampling technique was used to select ten educators and 15 students from different academic institutions in Krabi, Thailand. The data collected was analysed using content analysis and NVivo. The findings revealed that educators and students generally have a positive perception of using ChatGPT in education. The chatbot was perceived to be a helpful tool for providing immediate feedback, answering questions, and providing support to students. Educators noted that ChatGPT could reduce their workload by answering routine questions and enabling them to focus on higher-order tasks. However, the findings also showed some concerns regarding the use of ChatGPT in education. Participants were worried about the accuracy of information provided by the chatbot and the potential loss of personal interaction with teachers. The need for privacy and data security was also raised as a significant concern. The results of this study could help educators and policymakers make informed decisions about using ChatGPT in education.

Introduction

In the digital era, technology is increasingly developing and provides convenience for various aspects of life, including learning. Teaching effectiveness, student growth, and technology are all important components of a successful educational experience. Effective teachers who use technology to enhance their teaching can help students to achieve academic success and reach their full potential. Technology can provide access to a wide range of instructional resources, personalised learning experiences, and opportunities for communication and collaboration between teachers, students, and parents. By incorporating technology into education, educators can improve the quality and effectiveness of the learning process (Ekkarat & Charoenkul, 2023; Fauzi et al., 2023; Gibson et al., 2023). Many schools have begun using artificial intelligence (AI) technology to enhance the learning experience for students. AI can provide personalised learning experiences and adaptive feedback and assist teachers in managing their classrooms more efficiently. For example, AI-powered chatbots can help students with their homework, answer questions, and provide immediate feedback. AI algorithms can also analyse student data to identify areas where a student may struggle and recommend specific resources or interventions to address those challenges. Additionally, AI can assist teachers in grading, curriculum planning, and administrative tasks, freeing up more time for classroom instruction and student support. By leveraging the power of AI, schools can offer a more personalised and effective learning experience that helps students achieve their full potential (Chassignol et al., 2018; Chiu & Chai, 2020; Kuleto et al., 2021).

In November 2022, OpenAI released ChatGPT-3.5, a large language model based on AI. It is trained on massive text datasets in multiple languages and can generate human-like responses to text input. ChatGPT, a state-of-the-art AI chatbot, is based on the generative pre-trained transformer (GPT) architecture, which utilises a neural network to process natural language and generate responses based on the context of input text. Its ability to respond to multiple languages and generate refined and sophisticated responses based on advanced modelling makes it superior to its GPT-based predecessors. In addition, the name ChatGPT is related to its function as a chatbot, which is a program that can understand and generate responses using a text-based interface (Caulfield, 2023; Fraiwan & Khasawneh, 2023; Khademi, 2023; Mottes, 2023; Sullivan et al., 2023; Wu et al., 2023; Xames & Shefa, 2023). ChatGPT has garnered mixed responses in the scientific community and academia, primarily due to the ongoing debate about the benefits and risks of advanced AI technologies. While some experts view ChatGPT and other large language models as useful tools to improve efficiency and accuracy in writing and conversational tasks, others have expressed concerns about potential bias resulting from the training datasets used. This bias may limit ChatGPT's capabilities and result in factual inaccuracies, also known as 'hallucinations'. Furthermore, the security concerns associated with cyber-attacks and the spread of misinformation through large language models like ChatGPT need to be carefully considered by the scientific and academic communities (Crawford et al., 2023;

Firat, 2023; Sallam, 2023).

The use of ChatGPT in education during the digital era is a topic that has gained significant attention in recent times (Rathore, 2023; Shahriar & Hayawi, 2023). As an AI-powered chatbot, ChatGPT has the potential to revolutionise the way students and educators interact and learn. However, to fully understand its impact, it is crucial to study the perspectives of educators and students on implementing ChatGPT in education. Therefore, this research aims to explore the perceptions of educators and students on the use of ChatGPT in education during the digital era. The research questions are: (1) What are the perceptions of educators and students regarding the integration of ChatGPT in education during the digital era? And: (2) What are the potential benefits and challenges associated with using ChatGPT in education, as perceived by educators and students?

Related literature review

The origins of AI and chatbots can be traced back to the 1950s when scientists first began exploring artificial intelligence (Almelhes, 2023). The early developments of AI included the creation of the first AI program called ELIZA, which aimed to replicate human conversation. Over time, AI technology progressed and led to the development of more advanced chatbots that can understand and respond to complex requests. Today, chatbots and AI are utilised in numerous industries, from healthcare to customer service, continuously advancing as technology progresses. One of the cutting-edge AI chatbot technologies is ChatGPT, which uses natural language processing and machine learning to allow users to interact with a virtual assistant. ChatGPT, an advanced AI chatbot, results from cutting-edge research conducted by OpenAI, an American AI research laboratory. As part of the generative pre-trained transformer (GPT) family of large language models (LLMs), ChatGPT's development involved a fine-tuning process that combined supervised learning and reinforcement learning techniques. ChatGPT is designed to be highly intelligent, intuitive, and capable of responding to complex requests in a human-like manner. With its advanced capabilities, ChatGPT is changing the way we interact with technology and paving the way for a new era of intelligent, conversational AI (Arya, 2019; Mijwil et al., 2023; Ray, 2023; Rudolph et al., 2023a, 2023b; Sullivan et al., 2023).

The integration of ChatGPT into education has sparked both enthusiasm and concern. Through the SWOT analysis framework, Farrokhnia et al. (2023) can see that ChatGPT's strengths and weaknesses are crucial to understanding its potential educational implications. While ChatGPT has the potential to improve learning efficiency, facilitate personalised learning, and increase access to information, its limitations include a lack of deep understanding, difficulty in evaluating response quality, and risk of bias and discrimination. The potential threats to education include issues such as the lack of context, potential academic integrity issues, and the perpetuation of discrimination, among others. Acknowledging these challenges and concerns and developing appropriate measures to ensure ChatGPT's responsible and ethical use

in education is essential. This requires a holistic approach that considers both the potential benefits and risks of ChatGPT and balances technological advancements with the preservation of fundamental educational values such as critical thinking and ethical behaviour. A review by Lo (2023) investigates the capabilities and potential issues of ChatGPT, an artificial intelligence-based chatbot launched in November 2022 capable of generating human-like responses. The review included 50 content-analysed articles using open, axial, and selective coding. Results showed that ChatGPT's performance varied across subject domains, with outstanding performance in economics, satisfactory in programming, and unsatisfactory in mathematics. Despite its potential as an instructional assistant and virtual tutor for students, there were concerns regarding ChatGPT's ability to generate incorrect or fake information and bypass plagiarism detectors. The review recommends updating assessment methods and institutional policies and providing instructor training and student education to respond to the impact of ChatGPT on the educational environment.

Hong's (2023) research delves into the impact of ChatGPT on foreign language teaching and learning. As a revolutionary online application, ChatGPT has caused immense concerns in education, particularly for foreign language teachers who rely heavily on writing assessments. The article first clarifies the mechanisms, functions, and misconceptions surrounding ChatGPT. It then discusses the associated issues and risks and offers an in-depth exploration of how learners and teachers can utilise ChatGPT. Hong argues that ChatGPT provides significant opportunities for teachers and educational institutions to enhance second or foreign language teaching while also providing researchers with numerous opportunities for exploring a more personalised learning experience. Overall, Hong's research highlights both the potential benefits and challenges of integrating ChatGPT into foreign language teaching. It also emphasises the importance of understanding its capabilities and limitations to make the most of this innovative technology.

According to the findings of Rasul et al. (2023), the utilisation of ChatGPT and other large language models (LLMs) in higher education offers both advantages and challenges. One benefit is that ChatGPT can support students by generating ideas for assessments, research, analysis, and writing tasks, potentially enhancing their learning experiences. However, it is crucial to acknowledge the potential drawbacks, such as the risks of academic misconduct, bias, the dissemination of false information, and inadequate assessment design, which can hinder the development of essential graduate skills and promote superficial learning. As a result, it is imperative for tertiary educators and students to exercise caution and ensure the ethical, reliable, and effective use of this technology in academic contexts. Similarly, Firaina and Sulisworo (2023) conducted a study on the usage of ChatGPT in higher education and found that it can assist users in various tasks, such as finding information, generating ideas, translating texts, and providing alternative questions to enhance understanding. However, the study emphasises the need for users to verify the information obtained from ChatGPT with more reliable sources and maintain a critical approach when utilising it. While ChatGPT has limitations, the respondents perceived its use as an effective way to

improve productivity and learning efficiency. Therefore, ChatGPT can be considered a promising learning alternative as long as users remain critical in utilising it and validating the information provided.

According to Benuyenah (2023), the development of ChatGPT has raised concerns and generated excitement within academic institutions. The capabilities of this chatbot are impressive, with its human-like abilities surpassing most tools available to students and researchers. The academic community and the media have taken notice, with millions of Google search results related to ChatGPT. While the chatbot was not specifically designed for academic writing, its potential for use in this area cannot be ignored. However, there are concerns about the potential for students to abuse the technology and cheat on assessments. While academic cheating is not a new phenomenon, the emergence of powerful AI tools such as ChatGPT raises new challenges. Some academics are concerned about the epistemic implications of using ChatGPT in assessments. However, despite the potential threats, there is a resolve to find ways to use ChatGPT effectively while addressing ethical concerns. It is important to note that some university programs, such as those in management studies and information technology, may have a higher risk of cheating. Educators must work to understand the capabilities and limitations of ChatGPT to ensure its responsible use in academia. Tlili et al. (2023) conducted a three-stage instrumental case study to examine the use of ChatGPT in education among early adopters. The study analysed social media posts, interviews, and user experiences to investigate concerns regarding the use of chatbots in education. While ChatGPT is a powerful tool in education, the study highlights the need for caution and guidelines on its safe use. The findings suggest several research directions and questions that researchers and practitioners should investigate to ensure the safe and effective adoption of chatbots, particularly ChatGPT, in education.

Methodology

The research approach adopted in this study comprises four key stages: research design, data collection, data analysis, and report writing, all of which are qualitative in nature. Qualitative research methodology aims to comprehend the decision-making processes and actions of individuals or groups and explain the occurrence of specific phenomena (Siripattanukul et al., 2022; Viphanphong et al., 2023). The study employed in-depth interviews to collect comprehensive responses to research topics and precisely meet the research objectives. According to Buschle et al. (2022), Busetto et al. (2020), and Majid et al. (2017), conducting interviews in a qualitative study involves several important steps to ensure a systematic and insightful data collection process. The researchers followed a systematic research process to conduct interviews and gather valuable insights. First, the researchers established clear research objectives, questions, and topics to guide participant selection and shape the interview questions. The researchers then selected participants using purposive sampling, considering their characteristics and experiences relevant to the study. The researchers developed open-ended interview

questions that encouraged participants to share detailed and meaningful perspectives. A pilot test was conducted to refine the questions and ensure clarity. Informed consent was obtained from participants, and the researchers scheduled and conducted interviews in comfortable settings, respecting participants' preferences. Active listening was emphasised during the interviews, and the researchers took detailed notes or recorded the interviews with consent. The recorded interviews were transcribed for easy analysis and coding. The researchers applied content analysis to identify patterns, themes, and relationships within the data. The findings were validated through data triangulation and sought participant feedback. Finally, the researchers interpreted the findings in light of the research objectives and relevant theoretical frameworks, uncovering key insights and implications for a comprehensive understanding of the research topic.

The interview protocol used in this study was designed to elicit feedback from both educators and students about their perceptions of ChatGPT as a tool for academic support. The protocol included open-ended questions that allowed participants to provide detailed and nuanced responses to the topics of interest. The interviews were conducted in English, with participants having the option to choose between in-person or remote sessions based on their preference. Additionally, to facilitate further analysis, the interviews were audio-recorded. Moreover, the present study also used the documentary method to examine relevant survey questions from secondary data. The interview questions were as follows:

- How has ChatGPT impacted your learning experience as a student or educator?
- What benefits do you see in using ChatGPT to answer routine questions and reduce educators' workload?
- How do you ensure the accuracy and reliability of the information provided by ChatGPT, especially in sensitive or complex topics?
- What is your opinion on the potential loss of personal interaction between educators and students due to the use of ChatGPT?
- How do you think ChatGPT providers can ensure the privacy and security of personal information shared through the chatbot?
- In what ways do you think ChatGPT could be improved to better serve the needs of educators and students?
- How do you balance using technology like ChatGPT with human interaction and support in the classroom?

The study utilised purposive sampling to select a sample of 25 key informants (ten educators and 15 students), a widely recognised qualitative research technique that involves deliberately selecting a sample based on the researchers' expertise that best suits the study's objectives. This method

aims to gather comprehensive knowledge about a particular population or phenomenon of interest (Woodeson et al., 2023; Zickar & Keith, 2023). The inclusion of higher education teachers in the study was based on their experience, expertise, and familiarity with the subject matter under investigation. The intention was to involve individuals who could offer valuable insights and perspectives regarding the research topic. Similarly, a purposive sampling approach was adopted for higher education students, targeting individuals who were actively enrolled in programs or courses that implemented ChatGPT. By specifically selecting students studying in the relevant field, the researchers aimed to gather information that would be highly informative and representative of the target population.

To qualify for participation in the study, individuals had to satisfy three inclusion criteria: 1) they needed to be at least 18 years old; 2) they needed to be Thai educators teaching or students studying in a higher education institution located in Krabi, Thailand; and 3) they needed to have current knowledge and experience in using ChatGPT. To obtain their informed consent and adhere to ethical research practices, participants were informed of the study's goals prior to participating in interviews or any other research activity. The interview data were gathered in February 2023. The data collected were analysed using content analysis, a systematic and objective approach to describing and quantifying specific phenomena from verbal, visual, or written data (Deri, 2022; Jangjarat et al., 2023; Namraksa & Kraivanit, 2023). NVivo, a qualitative data analysis tool used to organise and analyse large data sets, was also utilised (Woodeson et al., 2023).

The researchers interviewed ten educators and 15 students to gather their perceptions on using ChatGPT in education during the digital era. Table 1 presents the respondents' information, including their gender, age, and occupation, as well as the date and time of the interviews. The sample comprised ten higher education teachers, with an equal distribution of five males and five females. Their ages ranged from 21 to 42. Additionally, 15 higher education students were interviewed, consisting of nine males and six females. All of the student participants were 18 years old.

Results

The study identified several themes based on their responses, including positive perception, reduced workload, information accuracy, personal interaction loss, and data privacy. The interviews and analysis were conducted using content analysis and NVivo software. A word frequency query was employed to enhance the understandability of the results, and the words that the participants commonly used during the interviews were visualised in a word cloud (Figure 1).

Positive perception

Educators praised ChatGPT for its ability to quickly respond to students' questions and provide additional resources to enhance their understanding of a given topic. Some

Accuracy of information

Some participants expressed concerns about the accuracy and reliability of the information provided by the chatbot. They worried ChatGPT might provide incorrect or incomplete information, potentially harming students' learning outcomes. Some participants noted that ChatGPT's responses were based on pre-programmed algorithms, which might not always account for the specific nuances of a given question or topic. As a result, they felt that the chatbot might provide answers that were not entirely accurate or appropriate for the situation. Moreover, participants also pointed out that ChatGPT's responses were based on the quality of the data used to train it and that errors or biases in the training data could lead to inaccurate responses. This was seen as a particular concern in cases where ChatGPT was used to provide guidance on sensitive or complex topics, such as mental health or social justice issues. To address these concerns, some participants suggested that educators and students should be encouraged to critically evaluate the information provided by ChatGPT and seek additional information sources when necessary. Others suggested that ChatGPT should be regularly monitored and updated to ensure that it was providing accurate and up-to-date information. Overall, while participants acknowledged the potential benefits of ChatGPT as a tool for giving academic support, they also recognised the importance of ensuring that the information provided was accurate and reliable.

I worry that ChatGPT might provide incomplete or incorrect information that could harm students' learning outcomes (educator).

The chatbot's responses are based on pre-programmed algorithms that may not account for specific nuances, leading to inaccurate or inappropriate answers (educator).

Errors or biases in the training data used for ChatGPT could lead to inaccurate responses, especially in cases where sensitive or complex topics are involved (educator).

Loss of personal interaction

Participants observed that personal interaction between educators and students could be instrumental in building trust, establishing rapport, and fostering a sense of community in the classroom. They noted that face-to-face interactions allowed for more nuanced and empathetic responses to students' needs and concerns and could help to promote a deeper understanding of course materials. Participants also pointed out that personal interactions with educators could be especially important for students struggling academically or facing personal challenges. They noted that educators could provide personalised support and guidance that might not be possible through a chatbot and that this support could be crucial for helping students to succeed. To address these concerns, some participants suggested that ChatGPT should be used in conjunction with, rather than as a replacement for, personal interactions between educators and students. They noted that chatbots could be useful for providing initial support and guidance, but

educators should also be available to provide personalised support and establish meaningful connections with their students. Overall, participants recognised the potential benefits of ChatGPT as a tool for providing academic support but also emphasised the importance of maintaining personal interaction between educators and students as a key component of the educational experience.

Personal interaction between educators and students could be instrumental in building trust, establishing rapport, and fostering a sense of community in the classroom (educator).

Educators could provide personalised support and guidance that might not be possible through a chatbot, and this support could be crucial for helping students to succeed (educator).

Chatbots could be useful for providing initial support and guidance, but educators should also be available to provide personalised support and to establish meaningful connections with their students (student).

Data privacy issue

Participants pointed out that using ChatGPT involved sharing personal information, such as students' names, email addresses, and academic performance. They were worried that unauthorised individuals could access this information or use it for purposes other than academic support. They were also concerned about the potential for data breaches or cyber-attacks that could compromise their personal information. To address these concerns, the participants suggested that ChatGPT providers implement robust data protection measures, such as access controls, to ensure the privacy and security of personal information. They suggested that educators and students should be provided with clear information about how their data would be used and protected and should be given the option to opt out of using ChatGPT if they had concerns about data privacy. Overall, participants recognised the potential benefits of ChatGPT as a tool for providing academic support. However, they emphasised the need for strong data protection measures and clear communication about data privacy to ensure students' personal information was secure and used only for its intended purposes.

I am concerned about the amount of personal information that would be shared through ChatGPT and how it would be protected from potential cyber-attacks or misuse by unauthorised individuals (student).

Data protection should be a top priority when using ChatGPT in educational settings. Robust access controls should be implemented to ensure that personal information is secure and not accessed by unauthorised individuals (student).

It is important that educators and students are provided with clear information about how their personal data will be used and protected by ChatGPT providers and given the option to opt out if they have concerns about data privacy (educator).

Classroom toolkit: Utilising ChatGPT as a resource

Incorporating ChatGPT as a resource in the classroom can bring various benefits and enhance student learning experiences. This toolkit provides guidance on how educators can effectively utilise ChatGPT to support teaching and learning. Including a toolkit showcasing how ChatGPT can be used as a resource in the classroom would be beneficial. This includes:

- **Generating ideas:** Encourage students to use ChatGPT to brainstorm and generate ideas for various assignments, projects, or research topics. It can provide a starting point or spark creativity (Cox & Tzoc, 2023; Kiliç, 2023).
- **Immediate feedback:** Leverage ChatGPT for instant feedback on student work. Students can input their written responses, essays, or code, and ChatGPT can provide constructive suggestions and highlight areas for improvement (Kiliç, 2023).
- **Answering questions:** Encourage students to utilise ChatGPT to find quick answers to factual or conceptual questions related to the subject matter. It can serve as a convenient resource for students to clarify doubts (Cox & Tzoc, 2023; Dwivedi et al., 2023).
- **Summarising texts:** Students can input lengthy texts, articles, or research papers into ChatGPT to obtain concise summaries. This can help students quickly grasp key ideas and concepts (Ray, 2023; Sun & Hoelscher, 2023).
- **Language support:** ChatGPT can assist students in improving their language skills. It can help with grammar, vocabulary, sentence structure, and overall language fluency, acting as a virtual language tutor (Moqbel & Al-Kadi, 2023; Sun & Hoelscher, 2023).
- **Independent learning:** Encourage students to explore topics independently using ChatGPT. They can input keywords or questions to access relevant information and resources, promoting self-directed learning (Rasul et al., 2023).
- **Ethical use:** Emphasise the importance of using ChatGPT ethically and responsibly. Educate students about the limitations and potential biases of AI models and encourage critical thinking when evaluating the information provided by ChatGPT (Mhlanga, 2023).

The toolkit serves as a guide to incorporating ChatGPT as a resource in the classroom. It offers suggestions for leveraging its capabilities to enhance student learning, foster independent inquiry, and provide additional support. However, it is essential to maintain a balance between utilising AI tools and promoting human interaction, critical thinking, and deep engagement with the subject matter (Frackiewicz, 2023; Hassani & Silva, 2023; Kiliç, 2023).

Discussion

This study explained the perceptions of educators and students on the use of ChatGPT in education during the digital era. The perceptions of educators and students regarding the integration of ChatGPT in education during the digital era are generally positive. ChatGPT was viewed as a helpful tool for providing immediate feedback, answering questions, and reducing the workload of educators. Educators and students appreciate the chatbot's ability to provide immediate feedback, answer questions, and provide support outside regular classroom hours. However, there are concerns about the accuracy of the information supplied by ChatGPT and the potential loss of personal interaction with teachers. The potential benefits of using ChatGPT in education, as perceived by educators and students, include increased efficiency in answering routine questions, freeing up time for educators to focus on higher-order tasks, and providing students with immediate feedback and academic support. However, there are also potential challenges, such as concerns about the accuracy of information provided by ChatGPT, the need for privacy and data security, and the possible loss of personal interaction between educators and students. These challenges need to be addressed to ensure that ChatGPT is used effectively and safely in the educational setting.

The findings were consistent with several studies. For instance, Rahman et al. (2023) have highlighted the practical applications of ChatGPT in academic research, including new idea generation, outlining research topics, and summarising large texts to identify key findings. However, they also observed some limitations in using ChatGPT to write an academic article, such as the potential for misleading research problems, questions, and gaps. Additionally, ChatGPT cannot conduct statistical analysis due to its inability to access datasets. Therefore, the researchers recommend that ChatGPT be used as an e-research assistant to complement a researcher's work and improve efficiency rather than as a tool to write a research article alone. It is important for researchers to take accountability for using ChatGPT and to mention its use in the article to maintain research integrity. In conclusion, while ChatGPT has its limitations, it can still be a valuable tool for academic researchers when used in conjunction with human control and transparency.

Moreover, Fauzi et al. (2023) indicated that ChatGPT could significantly contribute to improving student productivity by providing useful information and resources, improving language skills, facilitating collaboration, improving time efficiency and effectiveness, and providing support and motivation. However, ChatGPT should be viewed as an adjunct to, not a substitute for, human interaction and students'

hard work in learning and achieving their academic goals. Gupta et al. (2023) concluded that ChatGPT demonstrated high accuracy in coming up with novel ideas for systematic reviews, suggesting potential applications outside of plastic surgery research. According to the authors, ChatGPT may also be used for patient education, virtual consultations, preoperative planning, and postoperative care, providing a simple answer to the challenging problems encountered in the field of plastic surgery.

Furthermore, Sok and Heng (2023) have found that ChatGPT has the potential to bring significant benefits to students, educators, and researchers. These benefits include improved formative and summative evaluations, enhanced pedagogical practices, support for personalised learning, academic outline generation, and idea brainstorming for articles or essays. However, it is crucial to acknowledge that ChatGPT also has its limitations, such as the risk of academic integrity, biased evaluations, factual inaccuracies, and over-reliance on AI that may hinder the development of important life skills. Therefore, these limitations must be addressed to ensure the effective use of this transformative AI tool for education and research. By doing so, ChatGPT can be leveraged as a valuable tool to enhance learning and research while promoting ethical and responsible use.

Conclusion

Based on the study's results, it can be concluded that ChatGPT has the potential to be a valuable educational tool in the digital era. Both educators and students had a generally positive perception of the chatbot's use in education, and educators noted that it could reduce their workload by answering routine questions. However, concerns were raised about the accuracy of information provided by the chatbot, the potential loss of personal interaction with teachers, and the need for privacy and data security. To ensure the effective and ethical implementation of ChatGPT in education, it is recommended that educators and policymakers carefully consider the benefits and drawbacks of its use. Educators should also provide guidance and training to students on effectively using ChatGPT as an educational tool.

Additionally, efforts should be made to address the concerns raised, including improving the accuracy of information provided by ChatGPT, finding ways to maintain personal interaction between educators and students, and prioritising data privacy and security. Overall, this study provides valuable insights into the perceptions of educators and students on using ChatGPT in education and offers recommendations for its implementation. Future research could explore the long-term effects of using ChatGPT in education and compare its effectiveness with traditional teaching methods.

The present study contributes to a deeper understanding of the topic by focusing on the perceptions of educators and students in Krabi, Thailand, regarding the use of ChatGPT in education during the digital era. By narrowing the scope to this specific context, the study provides valuable insights not extensively explored in the Thai educational setting, adding to the existing body of knowledge. By focusing

on educators' and students' perspectives, the study sheds light on their experiences, opinions, and concerns related to integrating ChatGPT in educational settings. The findings of this research contribute to the existing body of literature on ChatGPT by expanding the knowledge base and offering new insights. The outcomes provide researchers with a foundation for further investigations in this field, as they highlight important aspects that can be explored in future studies. Scholars can build upon these findings to delve into previously unexplored elements, such as the specific pedagogical approaches that can maximise the benefits of ChatGPT, strategies for addressing its limitations, or the impact of ChatGPT on different subject areas or student populations. By offering valuable insights and implications, this study adds to the existing literature on ChatGPT in education during the digital era, enriching the understanding of its potential benefits, challenges, and perspectives of key stakeholders. It serves as a stepping stone for future research endeavours, providing a basis for researchers to expand their research horizons and contribute to the ongoing discourse surrounding the effective and responsible use of ChatGPT in educational contexts.

As with any study, some limitations should be acknowledged. Firstly, the study was conducted in a specific location (Krabi, Thailand) with limited sample size. Thus, the findings may not be generalisable to other contexts, and future research should include a more diverse and larger sample size. Secondly, the study focuses only on the perceptions of educators and students towards the use of ChatGPT in education. It would be interesting to explore the views of other stakeholders, such as administrators, parents, and policymakers. Thirdly, the study only examined the use of ChatGPT in providing immediate feedback, answering questions, and reducing workload. Future research could investigate other potential uses of chatbots in education, such as personalised learning, student engagement, and assessment. Fourthly, the study highlights some concerns regarding the accuracy of information provided by the chatbot, loss of personal interaction with teachers, and data security. Future research could explore ways to address these concerns and ensure the successful implementation of chatbots in education. Overall, while the study provides a valuable contribution to the discourse on using ChatGPT in education, further research is needed to fully explore the potential benefits and challenges of chatbot implementation in learning environments. The findings of these studies could inform the development of evidence-based implementation strategies for ChatGPT in education and provide insights for further innovation in education technology.

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