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Research Article

UTILIZING INTERACTIVE ARTIFICIAL INTELLIGENCE IN ENGLISH LANGUAGE AND SCIENCE IN SELECT SOUTHEAST ASIAN CLASSROOMS

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Abstract
The proliferation of interactive artificial intelligence (AI) in the academic sphere maneuvers the steering of teaching and learning processes, which transfigures the roles of teachers and learners today. This study explored the perspectives and experiences of teachers and students in select Southeast Asian countries on the challenges and opportunities they faced in utilizing interactive AI. A qualitative narrative research approach was employed, following a series of scheduled semi-structured hybrid interviews, using a set of 10 content-validated interview guide questions, with 60 participants chosen through a non-probability sampling technique. After a rigorous thematic-narrative analysis, findings revealed capitalizing on the essential presence of interactive AI in education; however, there is a strong drive to establish clear policy guidelines that address ethical and fair access to AI in classrooms. Further, interactive AI customized learning and managed teachers' workloads; nevertheless, both should balance the utilization of interactive AI in their work. In view of equitable and inclusive education, ensuring equity in personalized learning with the use of interactive AI must be fostered. Conversely, problems included unequal access, ethical issues, and over-reliance on technology—all of which call for thoughtful planning and policy-making. Unless carefully implemented, interactive AI risks exacerbating existing inequities or undermining human contacts that lie at the heart of quality teaching and learning. This study underlines the need to blend the strengths of interactive AI with the irrepressible value of teacher-student interaction and tradition-based approaches. By promoting equity, transparency, and collaboration, interactive AI complements, but does not replace, the significant role of educators.

Keywords: Interactive Artificial Intelligence, Language Education, Qualitative Research, Science Education, Technology Integration.

INTRODUCTION

The field of artificial intelligence (AI) evolves, demonstrating capabilities for tasks requiring human-like understanding and decision-making. This propelled its integration across diverse industries, including education, where researchers explore the potential of AI to revolutionize various fields in education. Interactive AI in education generally draws support from different theoretical foundations, emphasizing its advantages in teaching and learning. These perspectives emphasize the positive impact of integrating AI in education. "Substitution, Augmentation, Modification, and Redefinition (SAMR) Model" (Blundell et al., 2022) developed by Dr. Ruben R. Puentedura, categorizes four degrees of classroom technology as framework to help teachers design, create, and integrate technology-infused lessons.

Despite a lack of technological tools and accessible training for teachers, "SAMR Model" remains instrumental in enhancing effective technology integration in classroom. Meanwhile, "Connectivism Learning Theory" introduced by George Siemens and Stephen Downes in 2005, attributes learning through cyber nodes rooted in social networks (Kropf, 2013). Nowadays, in education, web applications enhance collaboration and communication, shaping current and future trends (Kop & Hill, 2008; Afriani & Widodo, 2025; Beltran, 2025). Emerging technologies foster global networks among people, encouraging creative communication and knowledge creation beyond formal education (Listiani et al., 2023; Ariyani et al., 2025; Dzulfikar et al., 2025). Further, AI is supported by a three-level model of "Learning Theories" (Gibson et al., 2023), which integrates principles from various fields. With these frameworks, educators create innovative learning environments, researchers study interventions across interconnected levels, and practitioners use AI to enhance learning and performance.

With its potential to revolutionize myriad of societal aspects interactive AI dominated conversations worldwide. The vast internet landscape created unparalleled access to information for students and teachers, highlighting immense potential of AI-powered learning through digital platforms (Eltabakh, 2019; Naqvi, 2020; Suryani et al., 2024; Aridan et al., 2025), which open doors to maximizing learning effectiveness by integrating AI applications into curriculum design, teaching methods, and assessment (Hidayat et al., 2024; Torres et al., 2024). In Southeast Asia alone, recognizing the transformative power of AI, begins to contemplate the development of its guidelines and policies to effectively harness its benefits (Putra, 2024; Cortés et al., 2025; Fernandez et al., 2025). However, teachers hold diverse perspectives on AI integration in education (Kim et al., 2022; Alvarez, 2024; Villarama et al., 2025). AI augments educational experiences, particularly in teaching English as a Foreign Language (EFL) (Kim et al., 2022). Interactive AI supports language learning, from personalized tutoring systems to language proficiency assessment tools (Hassan et al., 2024). Despite these, educators stress the necessity of approaching AI utilization with caution, emphasizing the importance of considering factors such as student motivation, teacher technology readiness, and ethical implications of AI-driven educational interventions (Kim et al., 2022; Mansyuarna et al., 2023; Endra et al., 2024; Villarama et al., 2024). Moreover, the discourse surrounding AI in education extends beyond classroom, encompassing broader societal concerns such as workforce readiness, digital literacy, and future of work (Budiarti et al., 2024; Matias et al., 2024; Ikhsan et al., 2025; Julianti et al., 2025). As AI technologies become increasingly utilized into educational settings, questions arise about skills and competencies that students need to thrive in a rapidly evolving labor market. Likewise, there is a growing recognition of importance of fostering critical thinking, creativity, and adaptability alongside technical proficiency to prepare students for uncertainties of AI-driven future that adheres to equity and inclusivity (Torres et al., 2024). Inclusive education emphasizes equitable access and engagement for all (Razmeh & Salgado, 2024). AI plays crucial role in delivering personalized learning and targeted feedback (Halkiopoulos & Gkintoni, 2024). Technologies such as natural language processing and machine learning adapt to individual needs and preferences in both ELT and Science education, leading to enhanced language acquisition and scientific understanding (Villarama et al., 2024). Interactive AI empowers personalized support for learners with disabilities. AI-powered speech recognition and synthesis systems aid those with hearing impairments (Arquero et al., 2024; ElHennawy, 2024), while adaptive learning platforms cater to diverse learning styles and preferences in both English and Science education.

However, challenges remain as education changes due to technology utilization to improve teaching and learning outcomes, as part of digital transformation (Gkrimpizi et al., 2023; Villarama et al., 2023). Recently, studies focused on AI utilization such as ChatGPT to support personalized learning (Samad et al., 2022; Grassini, 2023; Harry, 2023). AI allows students to customize their experiences and

materials to achieve the best outcomes (Harry, 2023). Moreover, ChatGPT facilitates communication between students and teachers in virtual classrooms (Kılınç, 2023) as it helps teachers answer questions and provide clarifications in real-time, track students' progress, and receive notifications. Although AI promotes many opportunities, comes risks and challenges that teachers and students face. Utilizing AI questions accuracy and reliability of data (Grassini, 2023). A culture of academic dishonesty is ethical and moral concern (Grassini, 2023; Li et al., 2024). Privacy and security issues in utilizing AI arise from the collection and analysis of information (Harry, 2023; Mansyuarna et al., 2023; Li et al., 2024; Nou et al., 2025). These are just some of the opportunities and challenges on utilizing interactive AI and just like a coin with two faces, technology utilization has both positive and negative effects. Using AI requires that technology be approached with extreme caution and in-depth analysis (Gkrimpizi et al., 2023). Teachers need to weigh the benefits against disadvantages (Villarama et al., 2024); thus, they need further training and professional development to understand and use AI for more effective academic endeavor. Tallvid (2016) pointed that as AI offers great potential, it does not guarantee teacher effectiveness if they lack adequate preparations. Teachers' attitudes significantly influence successful adoption of new educational techniques, and some remain apprehensive on utilizing technology in classroom (Tallvid, 2016; Hébert et al., 2021; Villarama et al., 2022; Putri et al., 2025). This underscores the need for further research and support to bridge the gap between technology and its effective implementation.

While AI promises an academic revolution, limitations and ethical considerations demand attention. Lack of human interaction in AI-driven programs leaves learners yearning for personalized engagement (Khanzode & Sarode, 2020). AI often struggles with cultural nuances and underrepresented languages, which leads to misunderstandings and resource limitations (Kamalov et al., 2023; Omodan & Marongwe, 2024; Nwune et al., 2023; Nwoji et al., 2025; Sigar et al., 2025). The ability of AI to handle complex concepts, critical thinking, and nuanced feedback remains under development, which hinders progress in both ELT and Science education. Ethical considerations add another layer of complexity. Protecting learner privacy is crucial. Mitigating algorithmic biases that unfairly impact learning materials and practices is equally important. Ensuring equitable access to technology and internet is essential to avoid marginalizing learners due to limitations (Kamalov et al., 2023; Somantri et al., 2024; Roath et al., 2025). Despite promising studies, limited research explores perspectives and experiences of both students and teachers on the utilization of interactive AI in real-world educational settings. A comprehensive understanding of challenges and opportunities associated with its implementation, as well as its impact on student and teacher performance, remains elusive. A key research gap addressed by this study lies in the limited exploration of both teachers' and students' perspectives on the utilization of interactive artificial intelligence (AI) in real classroom settings, particularly within Southeast Asia. Previous studies have often focused on either the technical benefits of AI, the readiness of teachers, or the ethical challenges in isolation. Moreover, much of the existing literature remains centered on Western contexts, leaving little understanding of how interactive AI is experienced in English and Science classrooms in developing regions where issues such as equity, infrastructure, and digital literacy remain critical. This study therefore extends the discourse by investigating diverse stakeholder perspectives in three Southeast Asian countries, providing a more holistic view of the opportunities and challenges posed by interactive AI in education.

Therefore, this present study (1) explores the perspectives and experiences of students and teachers on the utilization of interactive AI; and (2) determines the challenges and opportunities of utilizing interactive AI in teaching and learning and its impact on students and teachers performance. This study contributes to the budding body of AI-related literatures by providing insights into the practical implications of utilizing interactive AI in academic settings in Southeast Asia. Further, by elucidating the perspectives of key stakeholders and identifying potential challenges and opportunities, this study offers valuable guidance for educators, policymakers, and researchers seeking to harness the benefits of AI in education while addressing pertinent concerns. While there is optimism on AI utilization to revolutionize English language and Science education in Southeast Asia and beyond, addressing challenges is crucial for realizing this potential across disciplines. By developing clear policies, ensuring equitable access to technology, providing comprehensive training, and implementing robust evaluation mechanisms, Southeast Asia and other countries pave the way for more ethical, effective, efficient, and fair AI utilization in academic, personal, and professional practices, ultimately enhancing outcomes for all.

RESEARCH METHOD

This study employed "qualitative narrative research approach" that explored the personal perspectives and experiences of the participants, which offered a deeper understanding and context, on the opportunities and challenges faced by students and teachers in select Southeast Asian countries regarding the utilization of interactive AI and its impact on their performances, through a series of scheduled semi-structured hybrid interviews from August 2024 to November 2024, using a set of 10 interview guide questions that is content-validated and reviewed by language experts, psychologist, and technology-based researcher, directed by Ethics Research Committee. With the permission of the participants, their responses were recorded and analyzed through "Thematic Approach" (Clarke & Braun, 2013). While this qualitative research investigates the perspectives and experiences of 60 English language and Science students and teachers in select Southeast Asian countries namely: Indonesia; Philippines; and Thailand, it focuses on the utilization of interactive AI and its impact on their performances during the first semester of Academic Year (AY) 2024-2025. It fails to consider other factors quantitatively such as age, gender, year level of students, socio-economic status, educational attainment of teachers, comparisons among different types of educational institutions (public, private, elementary, secondary, and higher education) beyond Southeast Asia, or the experiences of other users of interactive AI in various fields and/or courses like Culture and Arts, History, Mathematics, Research among others, which were not explored.

To provide fair access to excellent education at the school, a "non-probability sampling technique" was employed to choose participants based on specific criteria. A total of 60 students who were of legal age (at least 18 years) and professors from Indonesia (1-20), Philippines (21-40), and Thailand (41-60) were involved, as the researcher-professors came from these three countries. The participants in the study were assigned a code and labeled as R(n), where R represents respondent and (n) represents the specific number assigned to each respondent. For the AY 2024-2025, these 60 students and teachers had been deliberately selected based on their official enrollment and affiliation in the three Southeast Asian countries. All participants in the study were sought with ethical-informed consent approved by the Central Luzon State University (CLSU) Ethics Research Committee (ERC), with protocol approval code CLSU-ERC 2024-165, on March 6, 2024.

Throughout the semester, there were a combined total of 20 weeks allocated for the purpose of English language and Science classes interactions. This study took place during the initial semester of AY 2024-2025, including a total of 60 participants, with 10 students and 10 teachers from each of the three chosen Southeast Asian nations (Indonesia, Philippines, and Thailand). Each week, a total of two hours was allocated just for conducting semi-structured hybrid interviews in order to gather qualitative data. A sequence of hybrid interviews was conducted through Zoom considering the availability, willingness, and preparedness of both students and teachers. Approval from the CLSU-ERC (2024-165) was acquired before engaging in these research activities. Before commencing the study, the essential documents for obtaining consent from respondents were secured. To maintain the accuracy, reliability, and validity of the findings, data triangulation was observed through the researchers themselves, external reviewers and validators, and selected participants from Indonesia, Philippines, and Thailand.

During a series of scheduled semi-structured hybrid interviews with 60 respondents, this study was guided by a set of 10 open-ended self-constructed guide questions *(see Appendix)* as reviewed and content validated by select experts composed of language experts, psychologist, and technology-based researcher. The instrument is fractionated in three components: (1) letter of information to participants with informed consent form adapted from the California State University San Marcos and data privacy clause; (2) questions on perspectives and experiences of participants on interactive AI utilization; and (3) questions on challenges and opportunities on interactive AI utilization. Further, the instrument underwent pilot testing through a similar set of limited number of participants. After that, the researchers analyzed the data to eliminate minor issues and to improve the instrument prior the conduct of this study. The participants were well-informed and willingly agreed to have their hybrid interviews documented using written, audio, and video recordings.

This research examines the perspectives and experiences of students and teachers in select Southeast Asian countries regarding the use of interactive AI and its impact on their performances. The study involved a series of scheduled semi-structured hybrid interviews with 10 open-ended questions, to gather insights on the opportunities and challenges faced in this context. The study aimed to identify significant statements that capture the experiences of 60 English language and Science students and

teachers from Indonesia, Philippines, and Thailand. The responses were recorded, transcribed, organized, coded, analyzed, characterized, and thematically interpreted (Clarke & Braun, 2013). The researchers ensured the accuracy, reliability, and credibility of information and findings through the implementation of online data cross-checking and triangulation, with select reviewers from Central Luzon State University and Kasetsart University, and select participants from Indonesia, Philippines, and Thailand.

RESULTS AND DISCUSSION

This section presents and discusses the qualitative thematic-narrative analysis of this study, which explored the personal perspectives and experiences on the opportunities and challenges faced by students and teachers in select Southeast Asian countries regarding the utilization of interactive AI and its impact on their performances. The results show four (4) themes and core statements from the participants, as the qualitative summary of the research exploration.

Theme 1. Ethical Use and Fair Access to Interactive AI in Education

The use of interactive AI provided English and Science teachers a new way of programming lessons, creating contents, and engaging students; however, to utilize interactive AI for maximum benefits and equity, there should be policies ensuring ethical use and equitable access and transparency in application. Utilization of interactive AI in content generation, lesson preparation, and student engagement obtains well-defined use guidelines to avoid the potential misuse and bias. Unequal access to interactive AI tools concerns both teachers and students who lack access to technology such as computers and smartphones along with a good quality internet connection. In this sense, interactive AI worsens the current educational disparities. Therefore, fair-use policies extend to equitable access to all students and teachers, and make interactive AI an equal resource for all, irrespective of social and economic statuses.

> *"Teachers must study and learn the effects of utilizing interactive AI in the classroom or work, both positive and negative, to realize that every use of technology must be done carefully [R11]."*

Similarly, Modi (2023) emphasized the relevance of developing a fair, transparent, and responsible utilization of AI tools so that users can attend to ethical concerns and biases strategically. Teachers must be trained to utilize these interactive AI tools aptly and ethically, guaranteeing that it would not further inflict biases and inequalities in the classroom (Kim et al., 2022).

Theme 2. Balancing Human Integration with Interactive AI Assistance

While interactive AI provides valuable tools for teaching and learning, maintaining a balance between technology and human interaction is crucial. Teachers need guidelines to use interactive AI as complementary tools, rather than replacing critical aspects of education such as creative and critical thinking, and teacher-student interaction and collaboration. Over dependence on the utilization of interactive AI tools posts consequences such as weakening teacher-student authentic interaction; hence, policies should regulate the extent of AI utilization in classrooms to ensure its purpose to augment traditional teaching and not replace it.

> *"Teachers and students who utilize interactive AI tools without proper analytical thinking and judgment have negative impact on their development, especially the important skills in the future such as critical thinking and problem-solving skills [R23]."*

To utilize interactive AI tools responsibly, teachers need ongoing professional development to understand their capabilities and limitations. A mandate as regards training programs that help teachers pace with rapid advancements in AI, ensure their effective and efficient control over their teaching practices, which helps preserve human autonomy and allow for the best integration of AI into the classroom. Conversely, Dimitriadou and Lanitis (2023) revealed that the balance utilization of interactive AI tools enhances the traditional classrooms making them at par with trends and global standards. Both teachers and learners today leave with interactive AI tools and so it is important to understand these tools rather than see them as threats in human existence (Torres et al., 2024).

Theme 3. Ensuring Equity in Personalized Learning with Use of Interactive AI

The ability of interactive AI tools to personalize learning for students improve the achievement of learning outcomes, but policies are needed to ensure that this personalization is fair and does not inadvertently favor certain students over others. Teachers must utilize interactive AI tools in ways that promote inclusivity and fairness, thereby embracing diversity in learning styles and encouraging equal access to input to students in similar proportions even they learn utilizing interactive AI tools.

> *"Interactive AI tools can help teachers to do certain tasks quickly compared before but sometimes overreliance on interactive AI tools causes neglect on their part and reduction of attention given to details, to materials, and to learners [R37]."*

Unreviewed and unverified data or information generated with the use of interactive AI tools may unintentionally create biased contents; thus, it is highly important to implement safeguards to ensure AI-generated materials are accurate, fair, and inclusive, representing diverse perspectives and backgrounds (Pellas, 2023). Both teachers and learners should critically evaluate AI-generated contents before utilizing them to avoid inaccuracy, false, unethical, and unfair information (Yusuf et al., 2024).

Theme 4. Navigating Challenges in Utilizing Interactive AI Tools in Education

Interactive AI tools showcase extensive enhancements in education, yet several hurdles come in classroom use including accessibility issues, preparedness of teachers, and risk over-dependence on interactive AI tools. In this respect, for a more effective and efficient utilization of interactive AI tools in teaching and learning, teachers and students should have the necessary skills and knowledge to utilize the interactive AI tools responsibly (Akgun & Greenhow, 2022; Ng et al., 2023; Yulisman et al., 2025) therefore, initiatives should capacitate teachers and learners. Without such initiatives and support, people remain struggling and puzzled on the utilization of interactive AI tools.

> *"Teachers and students must have access to quality tools or equipment such as computers, smartphones, and the internet, to utilize interactive AI tools in education effectively; more so, policies should be present to exposure and orient the users properly [R49]."*

The utilization of interactive AI tools in the classroom translates to effective and efficient integration of technology in education; therefore, challenges should be addressed through evidence-based policies and continued research undertakings.

The novelty of this research is evident in its cross-country and cross-disciplinary approach. By examining English language and Science classrooms in Indonesia, the Philippines, and Thailand, the study contributes a comparative lens that is rarely explored in AI-in-education research. In addition, the dual focus on both students and teachers highlights the interconnected experiences of these stakeholders, while the thematic-narrative design reveals nuanced insights into how AI can both enhance and complicate classroom practices. Notably, the study advances the discussion by underscoring the importance of balance between technological adoption and human interaction, emphasizing that interactive AI should complement rather than replace teacher-student engagement.

The implications of these findings are significant for multiple educational stakeholders. For teachers, the study highlights the importance of ongoing professional development to enhance AI literacy and responsible integration into pedagogy. For policymakers, the research underscores the urgency of establishing clear guidelines to ensure ethical use, mitigate biases, and promote equitable access to AI tools. Curriculum designers are also encouraged to embed critical AI literacy skills into educational frameworks, equipping students to use AI as a supportive resource rather than a substitute for critical thinking and problem-solving. Furthermore, this research offers a foundation for future studies to expand into other subject areas, employ mixed-method or longitudinal designs, and examine long-term outcomes of AI integration in education.

Despite its contributions, the study is not without limitations. Its qualitative narrative design and relatively small sample size of 60 participants limit the generalizability of the findings beyond the studied contexts. The focus on three Southeast Asian countries provides valuable insights but does not fully capture global perspectives. Moreover, reliance on self-reported interviews may introduce personal bias, and the study did not account for factors such as age, gender, socio-economic background, or institutional

type, which may influence experiences with AI. Additionally, the exclusion of other subject areas such as Mathematics, History, and the Arts leaves room for further exploration in broader academic disciplines.

CONCLUSION

The study concludes that interactive AI holds significant promise for enhancing personalized learning, reducing teacher workload, and expanding educational inclusivity in Southeast Asia. However, its successful integration requires careful navigation of ethical issues, equitable access, and the preservation of teacher-student interaction. Rather than replacing educators, AI should serve as a complementary tool that amplifies learning opportunities while maintaining the irreplaceable value of human engagement. Policymakers, teachers, and researchers must collaborate to ensure AI adoption in education remains ethical, equitable, and sustainable, thereby enabling a future where technology strengthens rather than undermines the human essence of teaching and learning.

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AUTHOR CONTRIBUTIONS

All authors contribute equally to the conception and design of the study, and all other parts: Conceptualization, JAVillarama, LMMVDelaCruz, and KJCBarcelita; Methodology, JAVillarama; Instrument, JAVillarama; Validation, JAVillarama; Formal Analysis, LMMVDelaCruz and JAVillarama; Investigation, JAVillarama, LMMVDelaCruz, KJCBarcelita, IFitriani, and S Techakosit; Data Curation, JAVillarama, LMMVDelaCruz, KJCBarcelita, IFitriani, and STechakosit; Writing–Original Draft Preparation, JAVillarama, LMMVDelaCruz, KJCBarcelita, IFitriani, and STechakosit; Writing–Review & Editing, JAVillarama, LMMVDelaCruz, and KJCBarcelita; Revision and Supervision, JAVillarama.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

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