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Intelligent ESL Mobile Learning: A Quantitative Case Study on Students' Perceptions of AI Integration in a Malaysian University

Rafidah Abd Karim[1*], Nurul Farhani Che Ghani[2], Azurawati Zaidi[3], Farahidatul Akmar Awaluddin[4], Nor Najihah Norafand[5], Ong Elly[6], Mohd Hafiz Mat Adam[7]

[1,2,3,4]*Academy of Language Studies, Universiti Teknologi MARA Cawangan Perak, 35400 Tapah Road, Perak, Malaysia.*
[5,6,7]*Academy of Language Studies, Universiti Teknologi MARA Cawangan Perak 32610 Seri Iskandar, Perak, Malaysia.*

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ABSTRACT

The integration of Artificial Intelligence (AI) in mobile learning has introduced new prospects for personalised, efficient, and adaptive educational experiences in higher education. This study examines ESL Malaysian university students' perceptions of AI integration in intelligent mobile learning applications and their learning experience. In this study, a quantitative case study design was employed, and an online questionnaire was disseminated to 142 undergraduate students to collect data. The SPPS version 27 software was used to analyse the results. The results showed that the undergraduate students have positive perceptions toward the AI-integrated mobile learning applications for enhancing English language learning. Besides that, the findings revealed that there was a strong acceptance of AI-integrated mobile learning applications among the undergraduate students. The results indicate that although Malaysian university students have positive perceptions of AI-integrated mobile learning for ESL acquisition, successful deployment necessitates focused institutional assistance. Educators and curriculum developers need to deliver systematic education on AI literacy and ethical use to increase student involvement and limit dependency on AI technologies for language learning. Hence, the findings indicate that students are ready for AI-based mobile learning, and therefore, the adoption of AI technologies in ESL frameworks by higher education institutions is imperative to promote students' autonomy and language proficiency.

1. INTRODUCTION

Recently, AI breakthroughs have revolutionised the world of education. Basaruddin and Mustapha (2025) suggested that Artificial Intelligence (AI) can minimise workload, automate monotonous processes and create inclusive, culturally relevant resources. However, several challenges such as deficiencies in legislation, inadequate infrastructure, and a lack of training were found. Today, Intelligent Mobile Learning Systems developed a prevailing tool to offer ESL teaching and learning, providing students with personalised learning and feedback prospects. Moreover, there are several benefits that AI integration offers for ESL learners such as AI-powered applications that use natural language processing, speech recognition,

[1*] Corresponding author. Rafidah Abd Karim.*E-mail address*: feida16@uitm.edu.my

and adaptive content delivery to give students real-world communication-like, interactive environments. Thus, the students can learn anytime and anywhere via AI-enhanced mobile learning to support their flexible learning and enhance their learning engagement.

AI has brought a revolutionary change in education, with one of the most prominent uses being in the field of learning English as a second language. Fitriati & Williyan (2025) mention that AI technology has a tremendous impact on pronunciation, subject invention, fluency, coherence, lexical resources and grammatical accuracy of the learners. The fast development of AI frameworks allows for the transfer of AI technologies to mobile devices, which in turn considerably increases the adoption of AI apps, applications that incorporate AI in their operations among smartphones (Li et al., 2022). Currently, AI – driven platforms offer us various experiences like individualised, flexible, and interactive learning via mobile devices. Therefore, if the higher education institutions' students integrate AI with mobile applications, they will gain many advantages especially for ESL learners. As the digital transformation of Malaysian institutions is mandated by the Malaysia Education Blueprint (Higher Education) 2015–2025, it is timely to evaluate students' perceptions of AI-supported learning to facilitate effective implementation and sustainable educational results. The recurrent issues that typically arise when cutting-edge technology is incorporated into educational settings also apply to AI (Moya & Camacho, 2024). According to (Karim et al., 2021) mobile applications can help ESL university students with their writing performance. Furthermore, the intelligent language systems help ESL learners to learn and practise English. The systems tools include chatbots, adaptive quizzes, and pronunciation systems. Nevertheless, there is still a lack of research evidence on the use of AI in education, specifically in ESL areas in Malaysia. The acceptability and continued use of AI tools are heavily influenced by students' perceptions of utility, usability, and trustworthiness. Hence, it is vital to investigate these aspects to determine how AI technologies might be successfully applied in ESL mobile learning. With its strong toolkit, AI is revolutionising mobile learning and how students learn (Karim, 2025).

This study presents AI-powered applications integrating with mobile devices for examining ESL students' perceptions derived from the use. The applications such as Dualingo and ELSA Speak can be used to help ESL undergraduate students' English learning. For example, the applications can explore individualise learning experiences, improve pronunciation and give fast remedial feedback. The conversational AI tools like ChatGPT and Gemini allow studying interactive conversation, quality of feedback and learners' confidence to use English in real-life situations. The inclusion of these applications allows for a more thorough evaluation of their key characteristics, such as convenience, personalisation, and real-time support, as well as insights into potential challenges, such as technical instability, that may impact their effectiveness in language learning. Thus, this study seeks to address a gap in current research by examining university students' perceptions of AI integration in mobile learning. Through a quantitative case study approach, the research aims to identify students' perceptions associated with AI-driven ESL mobile learning, thereby contributing to the dynamic and acceptable use of AI technologies in higher education.

1.1 Problem Statement

The integration of Artificial Intelligence (AI) into mobile learning settings offers several advantages such as adaptive, personalised and interactive learning for enhancing English learning among ESL undergraduates. However, despite these promising developments, the effective use of AI-powered mobile learning in Malaysian colleges remains a challenge. The use of AI tools in Malaysian universities for language learning is on the rise but there is a lack of empirical data on students' perceptions of the tools in line with the Malaysia Education Blueprint (Higher Education) 2015–2025. There is minimal definite data that exists on how students perceive these kinds of tools. Understanding learners' acceptance, attitudes and perceived usefulness of AI-based ESL mobile learning is important since these factors directly affect the success and sustainability of technology integration.

Previous studies have shown that the effectiveness of technological innovations in education depends on learners' perceptions of usefulness, ease of use and trustworthiness, as these perceptions significantly impact their response and continued use of educational technologies (Xu et al., 2024). However, there is a lack of quantitative evidence on students' perceptions of AI integration in mobile learning platforms in the Malaysian ESL setting. In general, the student acceptability of AI-assisted learning could be influenced by perceived simplicity of use, effectiveness, engagement, and worries about data privacy or technology dependence. Several concerns are raised regarding data security, openness of decision-making, and the potential for educational disparities through AI, which might result in educators being unwilling to include AI (Brandhofer & Tengler, 2024). Thus, these concerns deter educators and policymakers from designing and implementing intelligent mobile learning initiatives. According to Rachbauer, Graup, and Rutter (2025), the instructors need to be equipped with digital competency to effectively use AI tools in their teaching.

Thus, this paper aims to investigate ESL undergraduates' perceptions of intelligent ESL mobile learning. These findings point to a developing discourse about AI in education, which will focus on how intelligent systems might be designed to boost language acquisition, student autonomy, and technological preparedness in various higher education environments.

2. PURPOSE AND OBJECTIVES OF THE STUDY

This study aims to investigate the students' perceptions of intelligent ESL mobile learning among ESL Malaysian undergraduates. Specifically, the objectives of the study were as follows:

(1) To identify undergraduate students' perceptions of mobile learning
(2) To identify undergraduate students' perceptions of AI integration in mobile learning
(3) To investigate the impact of AI integration in English language learning
(4) To investigate AI and learning experience among undergraduate students

2. LITERATURE REVIEW

AI is a game-changer invention that can make a great impact in numerous domains, especially on education. AI personalises user experiences and enhances app performance, making mobile apps more creative and intuitive today. The integration of AI with mobile applications has shaped new learning initiatives and approaches in educational setting. AI-powered mobile apps can adapt learning materials to students' needs, provide prompt feedback, and give ongoing learning support (Yuen & Schlote, 2024). The investigation of AI integration with the use of mobile devices among university students is swiftly growing and shows significant and appropriate progress. The investigation of AI integration with the use of mobile devices among university student is swiftly growing and shows significant and appropriate. According to Mingyan et al. (2025), the AI-powered mobile application (Liulishuo) improved the students' speaking performance and helped them by providing immediate feedback and personalised teaching. Thus, it can provide new results and perspectives into the ESL learners' experience, what challenges need to be addressed and what future prospects should be highlighted with the use of application tools. The intelligent ESL mobile learning has transformed the ESL teaching environment. Sharmithashini and Hashim (2025) examined AI-based feedback systems for ESL learning and discussed obstacles and prospects. According to Guo et al. (2025), AI-enriched mobile learning has proved effective in enhancing university students' English language proficiency, particularly in terms of their writing skills. It can also engage the learners in a more customised, tailor-made, self-directed and flexible learning environment. The rapid rise of AI has transformed ESL teaching and learning environment and given personalised, adaptive and available learning experiences through the AI intelligent systems for enhancing ESL students' learning beyond the classroom. The meta-analysis indicated that the use of GenAI in learning contexts outside the classroom enhanced students' self-control and English skills (Guan & Gu, 2024). Platforms like WordTrek, CHEN-slate, Kahoot, Quizizz and Quizalize were widely acknowledged as useful to promote vocabulary

development and classroom engagement (Chen, 2023). However, for effective adoption of AI-integrated mobile learning, attitude and acceptability of learners toward technology are as dynamic as technological capabilities. AI technologies have arisen as a highly developed and prolific field of research, and they are becoming recognised as an innovative approach to ESL teaching and learning. Zulkifli and Ismail (2025) suggested that the AI tools such as ChatGPT, Gemini and Quillbot offered a lot of advantages for students' writing tools, specifically in ESL writing. For example, Quillbolt helped the students to edit the language and style. ChatGPT supported the students with creating ideas and supporting details and fostered students' independence in writing (Awaludin et al., 2025; Thiruchelvan & Zakaria, 2026). According to Adawiah et al. (2024), the ELSA Speak app facilitated ESL students' pronunciation and improved their dialogue.

In this study, the Unified Theory of Acceptance and Use of Technology (UTAUT) provides a suitable theoretical framework. This framework introduced by Venkatesh et al. (2003), has been widely used as a theoretical framework to describe how people accept new technologies in educational, organisational, and consumer contexts. This framework consists of main elements including, performance expectancy, effort expectancy, social influence, and facilitating conditions provides the basis for this study. The UTAUT model is particularly significant for a Malaysia-specific ESL setting as a study from a Malaysian university applied UTAUT to evaluate ESL learners' perceptions of AI-powered mobile applications for language learning. In the age of generative AI, students must traverse not only technology opportunities but also challenges of validity, originality, and academic integrity, making the UTAUT model more important than before. The UTAUT has also been proven relevant in past studies regarding the adoption of AI and mobile learning by university students (Lakulu et al., 2025). Moradi (2025) evaluated Chinese university students' adoption of ChatGPT using UTAUT and found that performance expectancy, social influence, and habit were important predictors of behavioural intention, whereas facilitating conditions and habit determined actual use and this research show that UTAUT has strong explanatory power in predicting both behavioural intention and actual usage of technology across a variety of educational situations. For this study, it analyses four main perception-based constructs of Mobile Learning, AI Integration, Impact on English Language Learning and AI and Learning Experience that can be linked to the UTAUT framework. These constructs provide a vital platform for assessing students' adoption of AI-powered mobile applications and their potential to improve English language learning experiences.

3. METHOD

This investigation adopted a quantitative case study design. This study sought to investigate the perceptions of intelligent ESL mobile learning among undergraduate students in a public institution in Malaysia. Participants included 142 undergraduate students who were randomly selected to participate in the study. The data was collected by an online questionnaire that was prepared and distributed to the participants. The questionnaire was constructed based on existing literature and tailored to the context of AI-integrated mobile learning for ESL teaching. The three English language expert reviewers established the content validity and their criticism was used to improve the clarity, relevance and appropriateness of the questionnaire items. A pilot study with 30 college students confirmed the clarity and usability of the instrument and yielded Cronbach's alpha coefficients of 0.70. The online questionnaire comprised of two parts: (A) Student profile (5 items) and (B) Perceptions of intelligent ESL mobile learning (34 items). Students were asked to answer a total of 39 items, which were grouped into four main constructs: (1) Mobile learning, (2) AI Integration, (3), Impact on English Language Learning and (4) AI and Learning Experience. Section B items were measured using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Data were analysed using SPSS version 27. Descriptive statistics were presented for the findings of the study.

The results were organised according to the questionnaire structure, and mean scores were interpreted using a five-point scale: Strongly Disagree (1.00–1.80), Disagree (1.81–2.60), Uncertain (2.61–3.40), Agree (3.41–4.20), and Strongly Agree (4.21–5.00). The three highest and three lowest mean scores for the Likert-scale items were reported.

4. FINDING & DISCUSSION

In this section, the student profiles were shown as in Table 1. A total of 142 responders were constituted of 46 male (32%) and 96 female (67.6 %) students. Just 2.8% of students are enrolled in a bachelor's program, while the majority (97.2%) are in a Diploma program. The majority of responses (96.5%) were between the ages of 17 and 19, with only 3.5% falling into the 20–22 age range. Students were also asked about the information of whether they like mobile learning or not. The majority of students (85.9%) from Table 1 indicated that they like mobile learning and only 14.1% students did not like to learn using mobile devices. The findings showed a high level of acceptance for mobile learning.

This result is consistent with earlier research suggesting university students in general have a positive attitude toward mobile learning due to its flexibility, easy access to learning materials, better communication, and increased learning engagement (Pham & Truong, 2023). The second question asked whether if the students think that AI helps in learning. The majority of respondents (98.6%) agreed that (AI) is helpful for students' learning, while only 1.4% disagreed. It suggests that the students largely accept AI as a learning tool. This outcome is in line with earlier studies that indicate students generally view AI as beneficial for improving academic achievement, fostering learning efficiency, and offering tailored feedback (Chan & Hu, 2023; Crompton & Burke, 2023).

Table 1. Student Profile

Characteristics		Frequency
Gender	Male	46 (32.0%)
	Female	96 (67.6%)
Programme	Diploma	138 (97.2%)
	Bachelor	4 (2.8%)
Age	17-19 years	137 (96.5%)
	20-22 years	5 (3.5%)
Do you like mobile learning?	Yes	122 (85.9%)
	No	20 (14.1%)
Do you think Artificial Intelligence (AI) helps students for learning?	Yes	140 (98.6%)
	No	2 (1.4%)

Table 2 illustrates the findings of students' perceptions of intelligent ESL mobile learning. There are four main constructs including Mobile Learning, AI Integration, Impact on English Language Learning, and AI and Learning Experience in this analysis. The findings showed the ESL undergraduates had a positive attitude toward the intelligent ESL mobile learning applications.

The discrepancies between the participants' views of mobile learning and AI integration in English language learning. Table 2 illustrates the discrepancies between the participants' views of mobile learning and AI integration in English language learning. The highest mean scores were for item 5, "The mobile app is a convenient way to study English" (M = 4.23, SD = 0.70). This is in line with previous studies that convenience is one of the major advantages of mobile-assisted English learning, which enables students to access learning resources at any time and any place, thus positively affecting their acceptance of mobile adoptions (Branzuela et al., 2025). Likewise, for item 10, the majority of the participants strongly agreed that AI proposes suitable learning activities for me (M = 4.23, SD = 0.70).

The third highest mean scores were for item 12. This finding indicated that most of the participants believed that the inclusion of AI made the learning experience more engaging (M = 4.15, SD = 0.71). This result is consistent with a previous study that found that AI-enhanced learning environments boost students' interest and engagement in learning activities by providing dynamic, flexible and personalised learning experiences (Tlili et al., 2023). The items indicated that students greatly liked the convenience, customisation and motivational features of AI-based mobile learning. Thus, the results indicated that AI tools offer ESL students various features that make learning more fun, engaging and stimulating. Panwale et al. (2025) and Wei (2023) also discovered the AI integration with mobile devices enhances students' learning and motivation in digital learning settings.

Table 2. Perceptions of Intelligent ESL Mobile Learning

Item	Construct	M	SD	Interpretation
	Mobile learning			
1	The mobile learning app is easy to navigate.	3.89	0.78	Agree
2	I experience minimal technical issues or glitches while using the app.	3.35	0.85	Uncertain
3	The content provided within the app is relevant to my English language learning needs.	3.94	0.75	Agree
4	I believe the app's content is high quality and accurate.	3.87	0.73	Agree
5	The mobile app is a convenient way to study English.	4.23	0.70	Strongly Agree
6	I am motivated to use the mobile app regularly.	3.89	0.81	Agree
	AI Integration			
7	The AI features in the app make my learning experience more personalized.	3.94	0.75	Agree
8	The AI-powered feedback on my tasks is helpful for improving my English.	4.13	0.76	Agree
9	I believe the AI to recommend appropriate learning activities for me.	4.23	0.70	Strongly Agree
10	The AI helps me identify my strengths and weaknesses in English.	3.89	0.81	Agree
11	I believe the AI to recommend appropriate learning activities for me.	3.94	0.73	Agree
11	The AI-driven conversations or chatbots are effective for practicing my English-speaking skills.	3.92	0.77	Agree
12	The AI integration makes the learning experience more engaging.	4.15	0.71	Agree
	Impact on English Language Learning			
13	Using the mobile app has improved my English proficiency.	4.01	0.84	Agree
14	I feel more confident in my English reading skills after using the app.	3.89	0.79	Agree
15	The AI-powered features have specifically helped me with my speaking pronunciation.	4.00	0.73	Agree
16	I am more confident in my ability to communicate in English after using the app.	4.00	0.73	Agree
17	The app has helped me to learn English more effectively than traditional methods.	3.92	0.81	Agree
18	I believe the AI integration has accelerated my English language learning progress.	3.86	0.77	Agree
	AI and Learning Experience			
19	The AI's recommendations help me focus on the areas of English I need to improve most	3.73	0.86	Agree
20	The AI makes the learning process feel more like a personal tutor.	3.90	0.74	Agree
21	I feel the AI respects my privacy and data	3.94	0.70	Agree
22	The AI's responses are human-like and easy to understand.	3.85	0.84	Agree
23	I find the AI's explanations of grammar rules and concepts to be clear.	3.58	0.93	Agree
24	The AI helps me overcome learning challenges and difficulties.	3.86	0.88	Agree
25	The AI provides timely and relevant feedback on my performance	3.87	0.78	Agree
26	I find the use of AI in this app to be a positive aspect of my education.	3.90	0.80	Agree
27	The AI features encourage me to spend more time studying English.	3.85	0.79	Agree
28	I feel the AI-powered learning is a valuable addition to my university education.	3.95	0.73	Agree
29	The AI helps me manage my study time by suggesting short, focused sessions	3.87	0.84	Agree
30	I find the app's AI-driven feedback on my writing tasks more useful than feedback from my peers.	3.89	0.84	Agree
31	The app's AI-powered game-like features make learning English more fun.	3.85	0.86	Agree
32	The AI-powered app is more effective for learning English than apps without AI.	3.58	0.87	Agree
33	The app has made me feel more autonomous in my learning journey.	3.89	0.84	Agree
34	I believe AI has a promising future in language education.	3.95	0.86	Agree
	Total average	3.89	0.57	Agree

On the other hand, the study revealed that the three lowest mean scores were based on the interpretation of the mean values in this study. First, most participants reported experiencing minimal technical issues or glitches (M = 3.35, SD = 0.85) while using the app for item 2 in the mobile learning construct. In the AI

and learning experience construct, the second lowest mean scores were item 23, showed (M = 3.58, SD = 0.93) that the majority of students agreed they found the AI's explanations of grammar rules and concepts to be clear. Within the same construct, most students indicated (M = 3.58, SD = 0.87) that the AI-powered app is more effective for learning English than apps without AI (item 3). From these results, it discovered that there is a need for enhancement for the intelligent ESL mobile learning approach such as technological stability, system usability, and the clarity of AI explanations. McCarthy and Yan (2024) found that reading in the digital era depends on sophisticated inferential processing skills and it is still a difficulty for many students to learn and employ. Moreover, AI integration for learning creates more advantages for learning activities toward an evolving digital technology environment. Kukulska-Hulme (2020) similarly found that AI applications support flexible learning, but their pedagogical effectiveness is often compromised by technical instability and the lack of transparent feedback. Overall, the results suggest that participants were open to the integration of AI in mobile learning with the highest mean scores on usefulness and motivation and the lowest mean scores on technical and instructional limitations that could be improved to increase the effectiveness of the system.

To summarise, the findings support the UTAUT framework as the students had positive perceptions of intelligent ESL mobile learning. Because students reported mobile learning apps were easy and convenient to use, the mobile learning construct aligns with effort expectancy. From the analysis, the results confirmed that the ESL undergraduate students believe that AI advances English language learning. The findings of the configuration of AI integration and Impact on English Language Learning constructs with Performance Expectancy construct revealed the confirmation. In contrast, AI and Learning Experience construct are aligned with Social Influence and Facilitating Conditions constructs, demonstrating that positive learning experiences are enhanced by institutional resources and motivation to implement AI-enabled mobile learning. Hence, the results illustrate that the students have a positive perception of the implementation of intelligent ESL mobile learning in Malaysian universities and align with the UTAUT model. Evidently, the ESL students support the use of AI-integrated mobile learning in Malaysian higher education because they believe it is hands-on, accessible, and advantageous to enhance English language learning.

5. CONCLUSION

This study aims to investigate the undergraduate students' perceptions of ESL intelligent mobile learning. The findings were based on their experiences in using the AI applications via mobile devices. The results revealed that they had a positive perception toward the ESL intelligent mobile learning experiences. Nevertheless, several issues related to technical stability, the clarity of AI-generated explanations, and usability still need to be addressed to develop intelligent systems that are to be more creative, reliable, user-friendly, and pedagogically effective. Generally, the findings demonstrate that the ESL undergraduates agreed that AI-driven mobile learning is beneficial and helpful for their English learning. To make this more effective, developers, instructors and educational institutions should support and collaborate in cultivating system functionality, enhance feedback precision, strengthen digital literacy and provide guidance for learners for intelligent ESL mobile learning technologies.

This study emphasises that intelligent ESL mobile learning has a considerable potential for ESL undergraduate students in higher learning institutions. AI tools have numerous assistants that can support the ESL students in improving language acquisition and enhance language learning effectively. This study provides useful implications for educators, policymakers, technology developers and educational institutions. The present study offers a foundation for future research to perform longitudinal studies, cross-institutional comparisons, and qualitative analyses to better understand learners' changing engagement with intelligent learning systems.

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7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of any conflicting interests.

8. AUTHORS' CONTRIBUTIONS

Rafidah Abd Karim: carried out the research, wrote and revised the article. **Nurul Farhani Che Ghani** and **Azurawati Zaidi:** conceptualised the central research idea and find the related literature. **Farahidatul Akmar Awaluddin** and **Nor Najihah Norafand:** designed the research and collected the data; **Mohd Hafiz Adam** and **Ong Elly:** anchored the review, revisions and approved the article submission.

9. DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

This manuscript was developed with the assistance of Quillbot for the purpose of language editing and improving clarity and readability. The tool/service supported the author(s) in grammar checking, language refinement, and improving the clarity of the manuscript, and the authors assume full responsibility for the final version submitted for publication.

10. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

No datasets or supplementary materials are available for this study.

11. ETHICS STATEMENT

Ethics committee approval was not required for this study.

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About the Authors

Rafidah Abd Karim, PhD is a senior lecturer at Universiti Teknologi MARA Tapah Campus, Perak, Malaysia. She received her PhD in TESL which specialises in Mobile Language Learning. She serves an editorial board, and she is also an active and reviewer for 15 numerous distinguished national and international journals. She has published more than 70 publications mainly in mobile technology, AI, mind mapping, women studies, gender studies and indigenous studies in both national and international levels. She can be contacted at feida16@uitm.edu.my

Nurul Farhani Che Ghani is a lecturer in the Academy of Language Studies, University Teknologi MARA, Malaysia. She has been involved in tertiary education since 2015 in UiTM. She has presented and published work in a range of areas including language learning, language and communication and indigenous studies. She sees herself as an academic whose involvement in community organisations and social action groups that informs her professional work in Education and Language Studies. She can be contacted at farhani8045@uitm.edu.my

Azurawati Zaidi is a Senior lecturer at Academy of Language Studies, Universiti Teknologi MARA, Malaysia. Her research interests include TESL, e-learning, gender equality and indigenous studies. Her area also includes collaborative learning, academic writing, SLA and blended learning. She was a member of a national research grants in indigenous studies by UiTM, Malaysia. She can be contacted at azura9237@uitm.edu.my

Farahidatul Akmar Awaludin is a Senior Lecturer and Researcher at the Academy of Language Studies, Universiti Teknologi MARA, Tapah Campus. With a distinguished career spanning 24 years in English Language Teaching (ELT), she has held a variety of senior managerial and academic leadership positions across multiple institutions. She holds an M.Ed. (TESL) from Universiti Pendidikan Sultan Idris (UPSI) and a B.Ed. (TESL) (Hons) from UiTM. Her research portfolio focuses on the intersection of technology and language acquisition, with specific expertise in Applied Linguistics, Mobile Learning, E-Learning, and Academic Writing. She can be contacted at farah904@uitm.edu.my

Nor Najihah Norafand is a Lecturer at Universiti Teknologi MARA, Kampus Sri Iskandar, attached to the Academy of Language Studies. She holds a Master of Arts in Linguistics and English Language Studies from Universiti Sains Malaysia and a Bachelor of Arts in English Language from Universiti Putra Malaysia. Her research focuses on linguistics, discourse analysis, and English language pedagogy, with publications addressing applied linguistics and language education. She can be contacted at najihahnorafand@uitm.edu.my

Ong Elly is currently attached to Academy of Language Studies in UiTM Perak Branch, Seri Iskandar Campus. She is interested in improving teaching and learning activities. She also enjoys creative writing. She can be contacted at ongelly@uitm.edu.my

Mohd Hafiz Mat Adam is currently attached to Academy of Language Studies in UiTM Perak Branch, Tapah Campus. He is interested in TESL and language studies. He can be contacted at mohd_hafiz@uitm.edu.my