

# AI Meets Pedagogy: Designing an ADDIE-Framed Mobile Application for ESL Teacher Empowerment

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## Abstract

The research investigates the creation of a mobile learning system enhanced with AI to improve ESL reading comprehension instruction for upper-primary Malaysian teachers. The researchers designed a mobile app based on ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design using the FlutterFlow low-code platform. Through its mobile-based structure, the developed application delivers teachers extensive tools to deliver differentiated reading comprehension teaching utilising flashcards, lesson plans and reading texts customised to match various CEFR proficiency levels, together with teaching instructions and videos and worksheets. Twelve upper-primary ESL teachers in Malaysia used open-ended feedback to enable various AI platforms to generate media content for the mobile app. The assessment of teaching staff exposed their struggles with delivering active and adjustable reading comprehension lessons while showing interest in mobile-based learning materials that are accessible to teachers. The pedagogical along functional quality of the mobile app was ensured through a two-step evaluation process. ESL professionals reviewed the educational content to verify correct implementation of the Common European Framework of Reference (CEFR), cultural sensitivities and instructional logical sequence. The usability testing involved three potential users who examined how intuitive the design was while they checked the practicality and flexibility of the available resources. The mobile application works to solve these challenges through artificial intelligence functions, which enable custom learning materials and content automation and lesson schedule optimisation. This research inquiry adds to existing academic knowledge about combining AI technologies into present-day language learning education systems. The research presents applicable recommendations for teachers and instructional designers, and policymakers who want to advance ESL instruction quality and access by using technology-based innovative methods.

**Keywords:** AI-Powered Mobile Learning, ESL Reading Comprehension, ADDIE Instructional Design, Adaptive Teaching Resources, Participatory Design

## Introduction

The integration of artificial intelligence (AI) and mobile learning technologies has emerged as a transformative approach to addressing longstanding pedagogical limitations in the language education landscape. In Malaysia, where the English language subject remains a critical determinant of academic development for students, particularly in reading comprehension, upper-primary English as a Second Language (ESL) teachers face persistent barriers in conducting adaptive and engaging instruction. Yahaya et al. (2021) stated that these challenges are compounded by heterogeneous classroom environments, where students exhibit diverse proficiency levels aligned with the Common European Framework of Reference for Languages (CEFR). Limited teaching resources have led to disengagement and uneven learning outcomes (Yasmin & Yasmeen, 2021; Rahman et al., 2022). Concurrently, the rapid evolution of AI technology may promise unprecedented teaching instruction and a personalised educational context (Harry, 2023). Yet their application in teacher-centric, mobile-based ESL teaching resources remains underexplored.

The primary purpose of this study is to explore the step-by-step mobile application development in assisting Malaysian upper primary ESL teachers in teaching reading comprehension efficiently. This study explicitly attempts to assess the materials provided for ESL teachers using mobile applications to enhance reading comprehension instruction and teaching resources. Novel developments in mobile resources for language teaching materials have demonstrated the potential of portable technologies to enhance accessibility in language education (Hasan et al., 2021). Therefore, the effective integration of mobile resources requires quality apps that support pedagogy, the readiness of students for digital learning, and a supportive classroom ecology (Lim & Toh, 2024). However, the available mobile apps and mobile-based resources for learning are predominantly focused on student-based applications (Fan et al., 2023), overlooking the importance of digital resources for teachers as knowledge disseminators. This gap is particularly pronounced in low-resource materials, where teachers often grapple with time constraints for preparation and limited training in teaching with technology integration (Domke & Cerrato, 2024). Therefore, this study adopts the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design model in developing a pedagogically sound and contextually relevant educational tool (Branch, 2009). Leveraging AI platforms, this research designs a mobile app using FlutterFlow, a low-code development platform, to empower ESL teachers with customisable, CEFR-aligned resources such as lesson plans, flashcards, video, teaching instructions, and different levels of worksheets.

The availability and appropriateness of technological tools can be inconsistent, impacting teachers' ability to use them effectively in ESL instruction (Manzoor et al., 2024). Hence, the development of this app is grounded in a participatory needs assessment involving twelve upper-primary ESL teachers in Malaysia, whose feedback was nuanced with the demand for mobile-enhanced tools that streamline lesson planning and locally personalisation materials. This teacher-centred approach aligns with constructivist principles, which emphasise the co-creation of knowledge through iterative collaboration between developers and end-users (Vygotsky, 1978). By harnessing AI to support content generation, the app not only reduces teachers' burdens but also ensures alignment by providing systematic suggestions in reading strategies tailored to students' proficiency levels as a critical factor in fostering reading comprehension (Naushan et al., 2023). This study is expected to contribute to the existing

literature on mobile applications for language learning, specifically in the context of reading comprehension instruction for upper primary ESL teachers in Malaysia.

### Objective

- i. Apply the ADDIE instructional design framework in developing an AI-enhanced content development for a mobile application.
- ii. Evaluate the content and usability of the AI-enhanced mobile app in facilitating ESL reading comprehension instruction.

### Methodology

This paper proposed a study to develop and adopt a mobile app to assist upper primary ESL teachers in Malaysia in teaching reading comprehension. The mobile app development complies with the ADDIE paradigm, an established model for the structured development of instructional materials (Branch, 2009). The ADDIE model offers a systematic method that ensures the mobile app is created and produced with a comprehensive comprehension of the target audience, their requirements, and the intended learning results. The Analysis phase involves scrutinising the teacher's needs and limitations in teaching reading comprehension to determine the app's learning objectives. The design phase establishes the app's content, features, and user experience to meet these requirements. The development phase is the development of the mobile application, which includes the user interface and the designation of instructional materials. The Implementation phase emphasises the app's deployment and provides instructions for teachers. Finally, the last phase is the evaluation phase, which examines the app's feasibility in improving classroom instruction and educational outcomes for reading comprehension. The outline of this article is based on Samsudin et al. (2021), which employed a study of mobile application development through the ADDIE model.

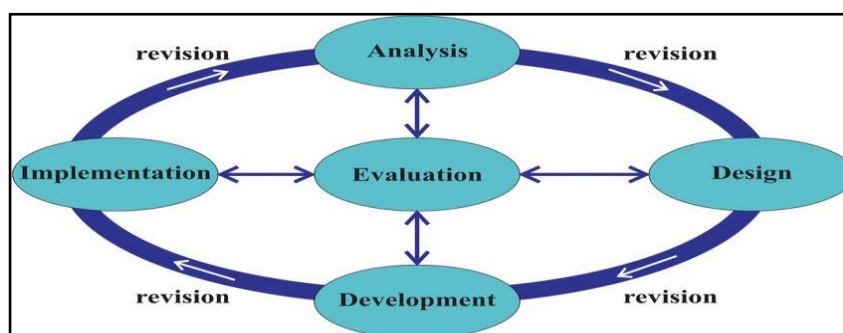


Figure 1. ADDIE Model

### Analysis Phase

The analysis phase starts with a thorough needs assessment to determine the challenges and suggestions in reading comprehension instruction for upper primary ESL teachers in Malaysia. This phase includes examining current literature and conducting an open-ended questionnaire with teachers to gain insights into teaching methods, learning practices, and technology resources and limitations in the Malaysian ESL education system. Table 1 below shows the tasks and outcomes that were conducted with the integration of ADDIE with some informants for data sources (Aldoobie, 2015).

Table 1

*Tasks and outcomes for the analysis phase*

No	Task	Outcome	Instruments/ Data Sources
1	Analyse the learners	Needs and problems of the learners	-Curriculum Analysis - Informal Interview with: - School Improvement Specialist Coach Plus (SISC+) of Language and TVET Department -Lecturers in the Language Departments - Microsoft Innovative Educator Expert (MIEE) - Administrator in Kota Kinabalu District - Excellent Teacher (GC) English Language - Teachers
2	Develop instructional analysis	Necessary steps and present opportunities	-Survey (open-ended questionnaires among teachers)
3	Create instructional goals	Specifying the end desired result	-Peer review
4	Analysis's learning objective	Attainment of goals	-Peer review

Besides that, based on the task of the instrument used to develop instructional analysis, an open-ended questionnaire has been distributed among upper primary ESL teachers in Sabah, Malaysia. The list of questions in the Google Form that has been distributed to the participants is as follows:

1. What is your opinion on developing a mobile app for upper primary ESL teachers to support reading comprehension instruction?
2. What gadgets are suitable for developing technological innovation for upper primary ESL teachers?
3. What features or components would you like to be included in a mobile app to support reading comprehension instruction effectively?
4. What training, support, or resources would you need to use a mobile app effectively to teach reading comprehension?
5. How could a mobile app be integrated into your reading comprehension curriculum or instructional approach?
6. Would you prefer the topic based on the textbook or random topics?
7. What types of assessments should be included in a mobile app for student evaluation?

According to Creswell (2018), open-ended questions encourage participants to generate responses, allowing the researcher to understand the investigated subject more deeply. The participants' contribution was significant in determining the components and features needed for an efficient mobile app development. According to Shofi and Jannah (2022), teachers should implement mobile applications to support reading comprehension lessons. Besides that, the preferred gadgets for mobile apps are mobile phones, tablets, and laptops. Participants expressed enthusiasm regarding the potential of the mobile app to incorporate engaging and interactive features, such as lesson plans, videos, reading text, audio, visual materials, and worksheets. For the resource to function as a teacher reference, the participants suggested that the researcher provide related courses, training, or e-books to explain how to use the mobile app. A mobile app could also provide opportunities for

continuous improvements for ESL teachers to facilitate suitable teaching instructions and guide them in the implementation process. Other feedback on mobile app integration is that it should be relevant to Malaysia's cultural context and diversity. In line with the statement from Hernandez et al. (2021), teachers and students had favourable thoughts regarding the importance of acquiring cultural knowledge to acquire the English language. The study's findings may encourage teachers to incorporate culturally-oriented resources into their instructional practices. There is a significant difference in teachers' preferences for the contents' topics to adhere to the upper primary curriculum topics (75%), but a significant portion also supports including random topics (25%) instead. Similarly, a study by Aji and Santoso (2020) emphasised integrating mobile app development with the curriculum and learning goals to enhance its impact on learning. For assessments, most participants (77.8%) preferred using differentiated-level worksheets as an appropriate evaluation approach for the mobile app teaching resources. The teachers strongly prefer assessment products that can be customised to meet the students' different learning needs and competence levels.

### *Design Phase*

The information received in the analysis phase is used to plan a strategy to develop an appropriate product design for the mobile app. In this phase, the researcher outlines the assessment's design to ensure the content is closely related to the context of teachers' needs. Aldoobie (2015) lists three stages of the design phase that consist of an assessment design, a medium of delivery and an instructional strategy for the outputs of instructional design.

In this study, all three stages of the design phase were considered when developing the mobile app. Among the important features emphasised is the testing objective for an assessment's design. The researcher decided to assess the outcomes of the instructional design for a one-cycle prototype in the formative evaluation stage. Apart from that, the medium of delivery of the contents will be through a mobile app, which will be accessible to the participants for easy installation. The design phase of this mobile app development was designated by considering the taxonomy of design and experience of mobile applications by Sandesara et al. (2022), as shown in Figure 2 below.

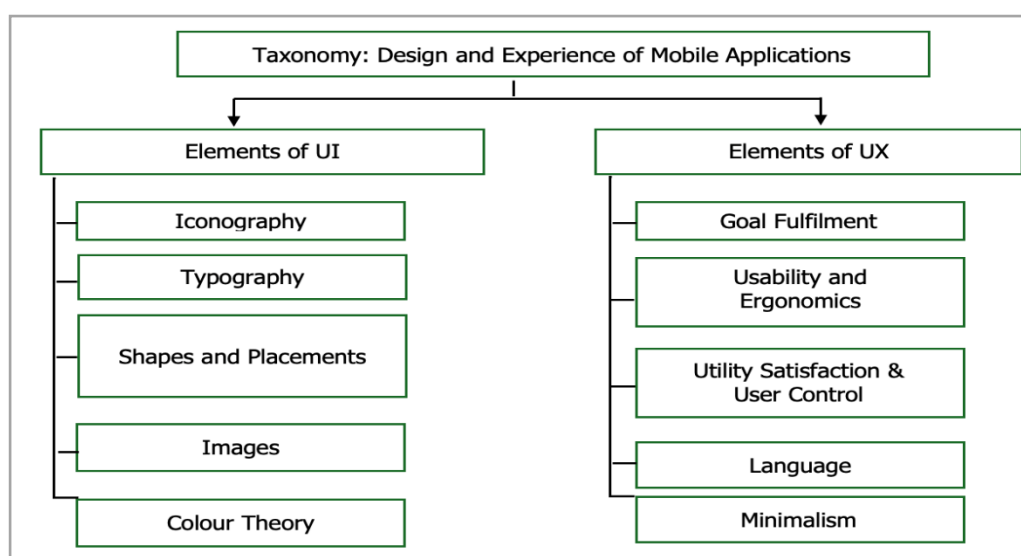


Figure 2. Taxonomy: Design and experience of mobile applications

Figure 2 above is a taxonomy aid that serves as a guideline for the researchers to design the elements of User Interface (UI) and User Experience (UX) to fulfil the users' visually appealing and user-friendly features. User Interface (UI) and User Experience (UX) are essential components of contemporary technology, involving design processes, workflows, and user engagement with products and services (Goel et al., 2022). Based on the open-ended questionnaire from the analysis phase, the content design comprises nine topics from the CEFR textbook but with more culturally related content and six output types. The feedback was used to create the mobile app design as shown in Table 2 below.

Table 2

*Mobile app design*

Topics	Output
Starter unit, towns and cities, days, wild life, learning world, food and health, sport, growing up and going away.	Lesson plan, reading text, teaching instructions, flashcards, video, and differentiated level of worksheets.

*Development Phase*

The third phase of ADDIE is the development phase of the instructional design. Therefore, the researcher needs to integrate the technology with the educational setting and process by referring to the analysis and design phase outlines. Aldoobie (2015) stated that development consists of three subphases of creating a factual sample for the instruction design, developing the materials of the course and running through the conduction of the design. The development phase intersects the conceptual design and actual implementation, ensuring that learning materials follow specific goals and teaching techniques. This stage is necessary for converting educational objectives into productive educational experiences to suit the study's objectives. The initial sketch of the design was created using GoodNotes on the tablet as a digital sketching process, as shown in Figure 3, to initiate the initial design of the app.

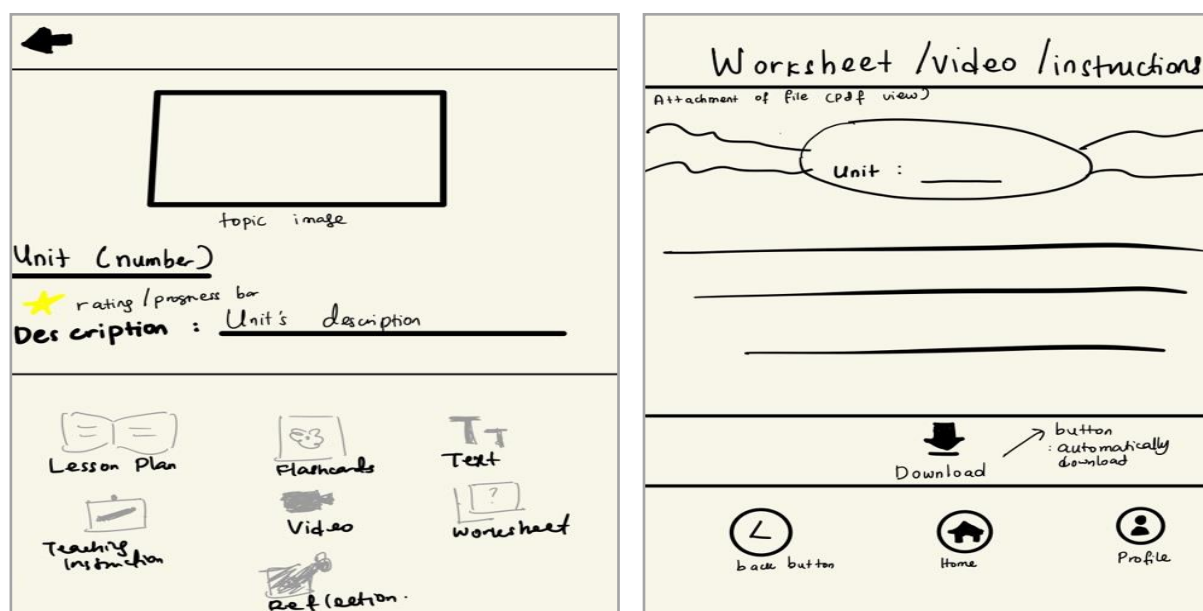


Figure 3. Sketches of the Design



The UI design should emphasise the mobile application's visually appealing components and interaction features. Since the users of this app are primary school teachers, there are critical considerations in UI design to serve the academic purpose of the app. Insufficient UI implementation can have a negative impact on various elements, including a lack of gaps in user interaction with mobile device systems, malfunctioning to effectively convey information, causing difficulty to users, and leading to user rejection of the program (Saputra & Kania, 2022). The researchers have been considering the mobile application's layout and information hierarchy by organising the app's content and functionality in an integrated and user-friendly manner. The primary colours of the app icon and background are a varied combination of purple, white and green. According to Liu and Proctor (2021), icons with a consistent colour showed lower visual search effectiveness, as indicated by longer task completion time, more fixation counts, and longer fixation duration, compared to icons with different colours. The selection of colours in UI design can significantly impact user emotions, perceptions, and behaviour, underscoring the significance of strategic colour selections (Huang, 2024). On these bases, the researcher combined various types of border shapes for the mobile application, such as rounded squares, linear, circular borders, and mixed icon shapes. The same research by Liu and Proctor (2021) stated that the potential impact of border shape was only gradually evident.

All course materials are developed based on the needs analysis from teachers' feedback. By referring to the output of the design phase, all the materials and contents are solely developed by the researcher and have been validated in the evaluation stage by the content-validating panel of members. The researcher developed the materials from prompts using various platforms and software such as Canva, Midjourney, Consensus, InVideo, and Gamma, based on the functions of each platform. All the contents are then stored at Firebase storage based on the authentication deployment of the mobile app. The generated content sources from various platforms are illustrated in Table 3.

Table 3

*Generate Content Sources*

No	Contents Generated	Sources
1	Worksheets	Consensus AI
2	Images	Midjourney AI
3	Video and Text to Speech	Invideo AI
4	Teaching instructions slides	Gamma AI
5	Flashcards	Canva
6	Storage	Firebase
7	Mobile application builder	FlutterFlow

The contents generated and sources used in the development of the mobile app were described and attached with the figures of items generated by the researcher. The images used in mobile applications are significant because images are among the crucial elements of UI. All the images used in this study are AI images generated by the researcher via Midjourney AI with a subscription to the Pro plan to generate the images. By referring to Midjourney's terms of service version, effective 7<sup>th</sup> March 2024, the prompter owns all assets created with services possible under applicable law. The owner can publicly display and distribute the image prompted using the AI. Gong (2021) investigates the utilisation of virtual reality teaching techniques and artificial intelligence technologies in creating artwork made with

digital media. The primary results suggest that integrating virtual reality teaching techniques with the benefits of artificial intelligence can enhance the teaching experience for educators and learners, resulting in more successful educational outcomes. The images generated by AI are attached in Figure 4 based on the prompt made by the researcher.



Figure 4. AI Images

Images generated for the mobile app are used for teaching materials such as flashcards and video-making by referring to the reading text of the lesson. The flashcards (Figure 5) are generated through the template provided by free Canva and are accessible to Canva's users.



Figure 5. Flashcards Images

Furthermore, Perez (2022) examines the significance of audio-visual input and on-screen text in acquiring a second or foreign language. The study explores multiple aspects of language acquisition by watching videos with subtitles or captions, encompassing the acquisition of vocabulary learning, comprehension, and the influence of various types of on-screen text. The study's findings show that utilising audio-visual input that includes on-screen text could improve the process of unintentionally acquiring new vocabulary and enhance overall comprehension of languages. This study provides strong justification for incorporating video alongside text-based materials in the language learning classroom. The video also includes integrated text-to-speech (TTS) technology to help students and teachers with the lesson. A study using TTS in reading lessons by Knollman et al. (2022) shows that most participants preferred the reading condition accompanied by Text-to-Speech (TTS) technology. They also implied several advantages when using this approach, particularly when reading lengthy or



challenging materials. TTS technology integration may support language learning and reading skills.

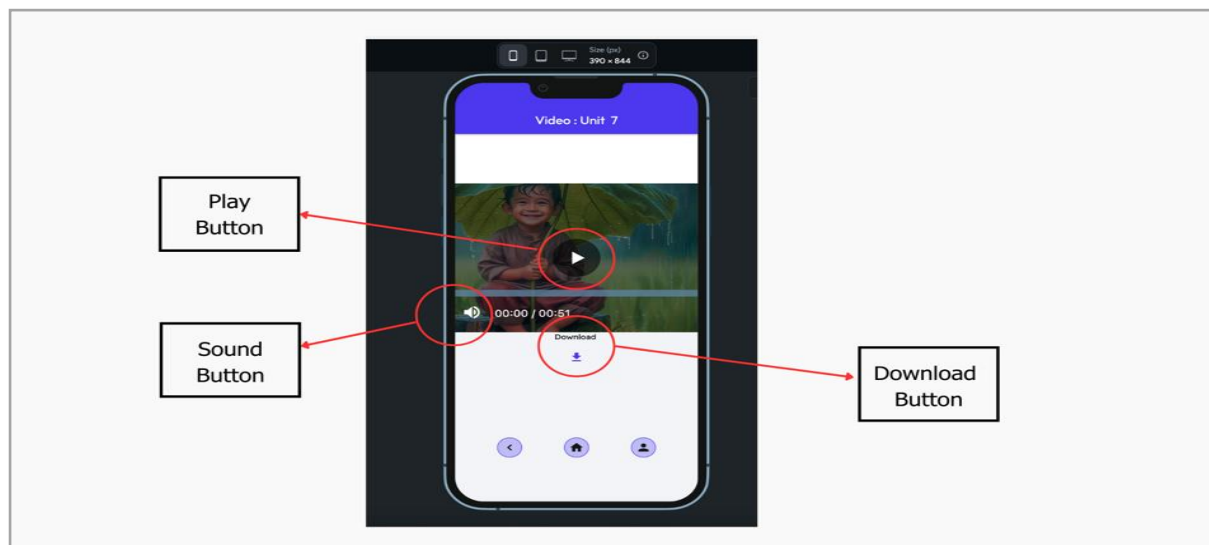


Figure 6. Screenshot of Video Page

Figure 6 shows a video page for one of the units in the mobile app developed. There are nine videos in the prototype by referring to the total number of topics. Hence, videos were made based on the reading text from the lesson plan provided, and images were generated for each page of the videos using Invideo AI. The users can download all the videos to help with early preparation before the lesson, to avoid the teacher conducting the lesson with internet connection disruption.

The pages of the mobile apps are then developed by referring to the initial design of the researchers' sketches and function-coding them with Java through the action buttons of each page. Whenever they want to log in to the app, the teachers will first log in to the primary authentication page, as shown in Figure 7. T

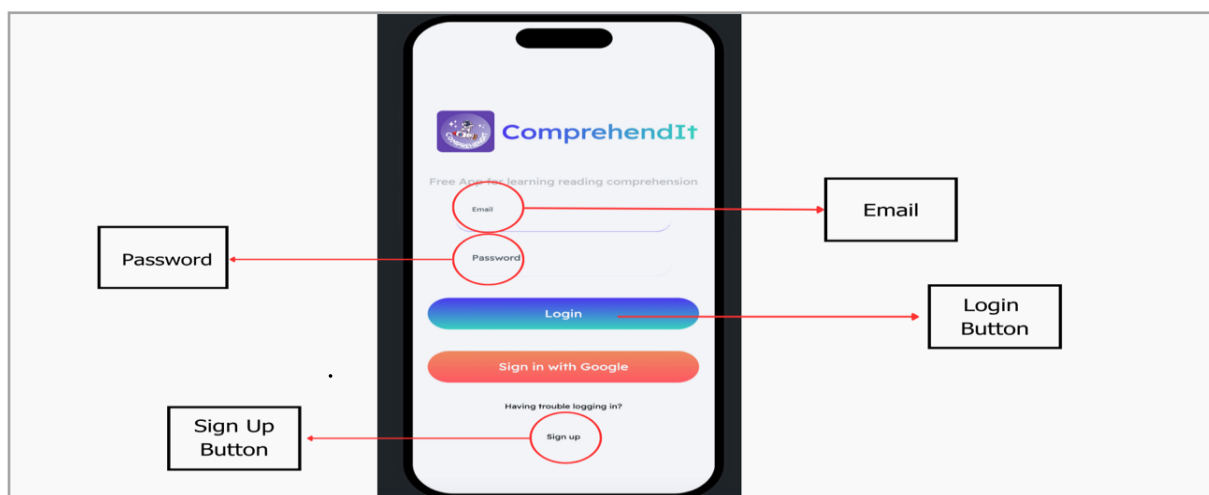


Figure 7: Screenshot of Log-in Page

The primary authentication page for the user to log in will be the mobile app's login page. Teachers must log in using the registered email and password created when they sign up for the account. Authenticated users can access all content and materials in the module provided. Therefore, if the user's log-in attempts are successful, the accessibility will be recorded through a real-time overview of Firebase, as shown in Figure 8.

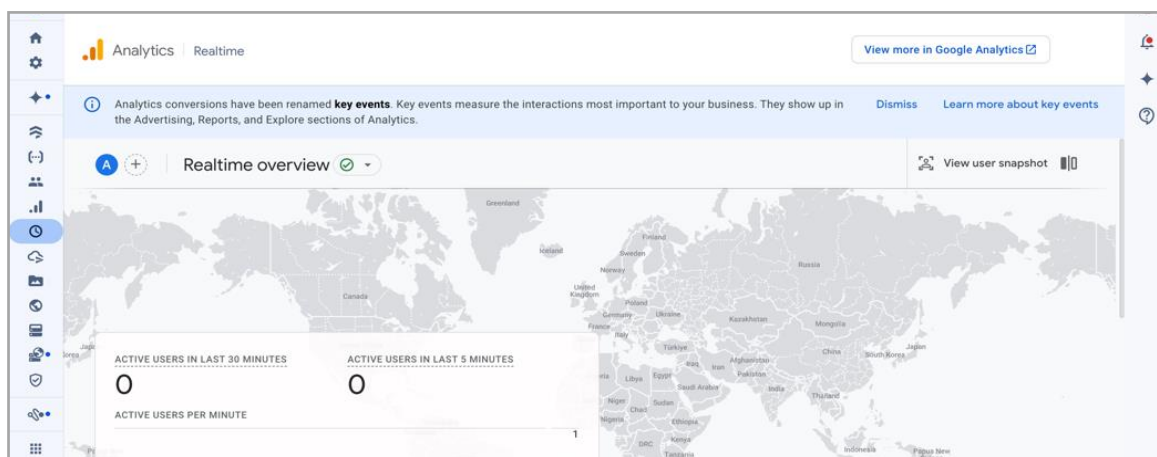


Figure 8. Real-time Overview

A real-time overview commonly indicates a dynamic and constantly generated overview or viewpoint of a system, process, or data collection. The platform incorporates synchronous information processing capabilities that facilitate immediate data visualisation and responsive interaction patterns. This real-time monitoring system enables teachers to engage in dynamic observation and adaptive response mechanisms, supporting evidence-based pedagogical decision-making through instantaneous data accessibility. The temporal immediacy of information presentation enhances the platform's utility for implementing responsive instructional modifications based on concurrent observational data. In the context of mobile app development, a real-time overview of Firebase refers to the capability of monitoring and tracking user activity and data modifications in mobile applications powered by Firebase as they occur. Another important page for the teachers is the profile creation page, as shown in Figure 9.

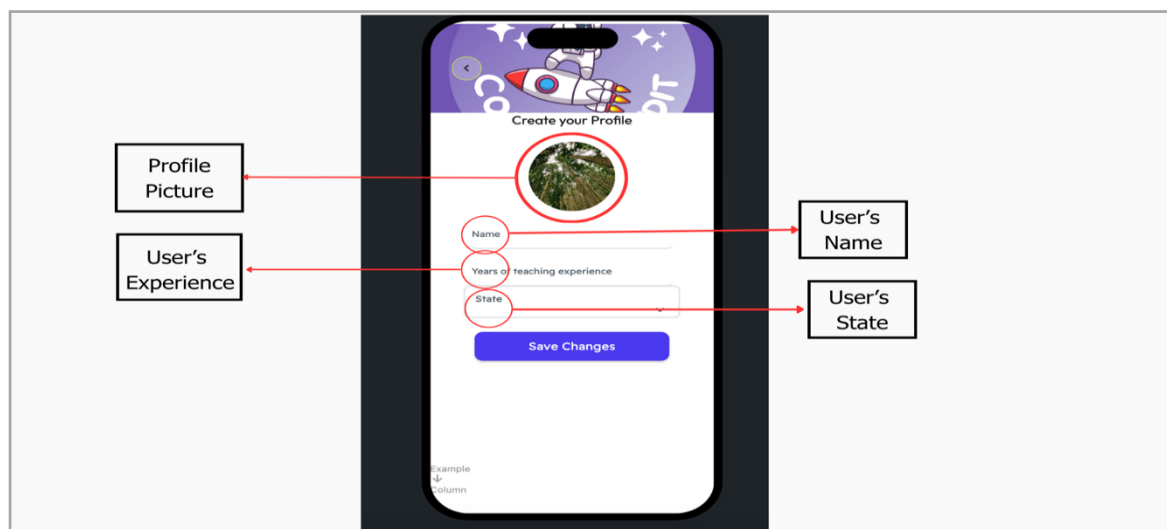


Figure 9. Screenshot of Create a Profile Page

Profile pages for mobile applications are crucial in terms of social learning. A text field column was created for users' years of teaching experience and the state where they come from. The profiles page facilitates user interaction by allowing them to connect with others, engage in discussions, and create groups because this mobile application includes social elements. Profile pages for mobile applications are crucial in terms of social learning. The profiles page facilitates user interaction by allowing them to connect with others, engage in discussions, and create groups because this mobile application includes social elements. The user can then control the app settings through the user settings dashboard in Figure 10 based on their preferences.

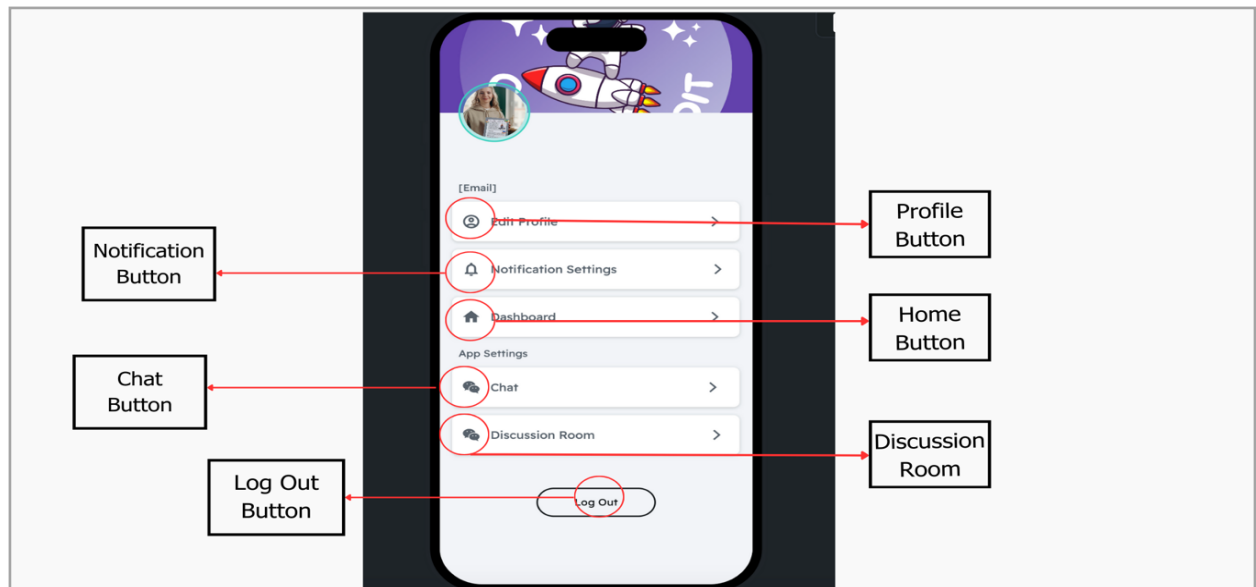


Figure 10: Screenshot of User Setting Dashboard

Figure 10 illuminates the critical functionality of user-setting dashboards by elucidating their multifaceted significance in user interface design and interaction management. The primary navigational interface element is a home button facilitating expeditious redirection to a comprehensive unit repository for teachers. Subsequently, an auxiliary interface control enables systematic access to notification management systems. The teachers can set reminders or customise them according to their preferences to stay notified with the app or mute the notifications to enable granular customisation of alert mechanisms. Other integration settings encompass a comprehensive suite of interpersonal communication and user management interfaces, including chat, discussion room, profile editing, and log-out buttons of termination controls.

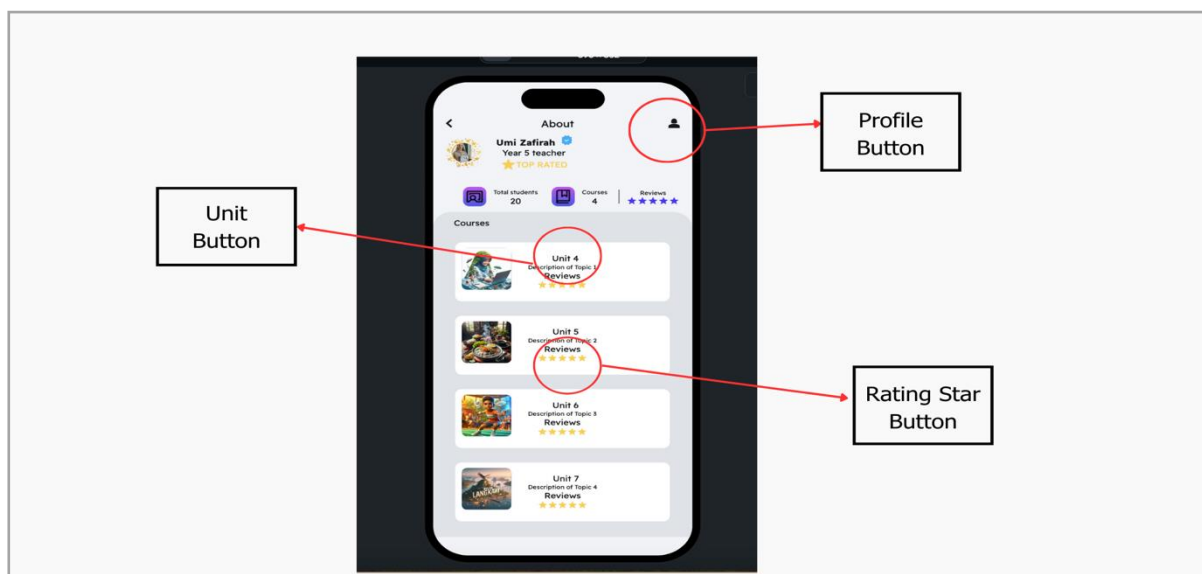


Figure 11. Screenshot of Dashboard

The application incorporates a customisable interface through its dashboard functionality (Figure 11), facilitating teacher autonomy in content selection and material accessibility. This page is a panel page that will enable users to navigate through the primary units of the app. In this user interface design methodology, the researcher strategically incorporates the ubiquitous star rating system mechanisms within the user settings panel, enabling a nuanced user-driven evaluation framework.

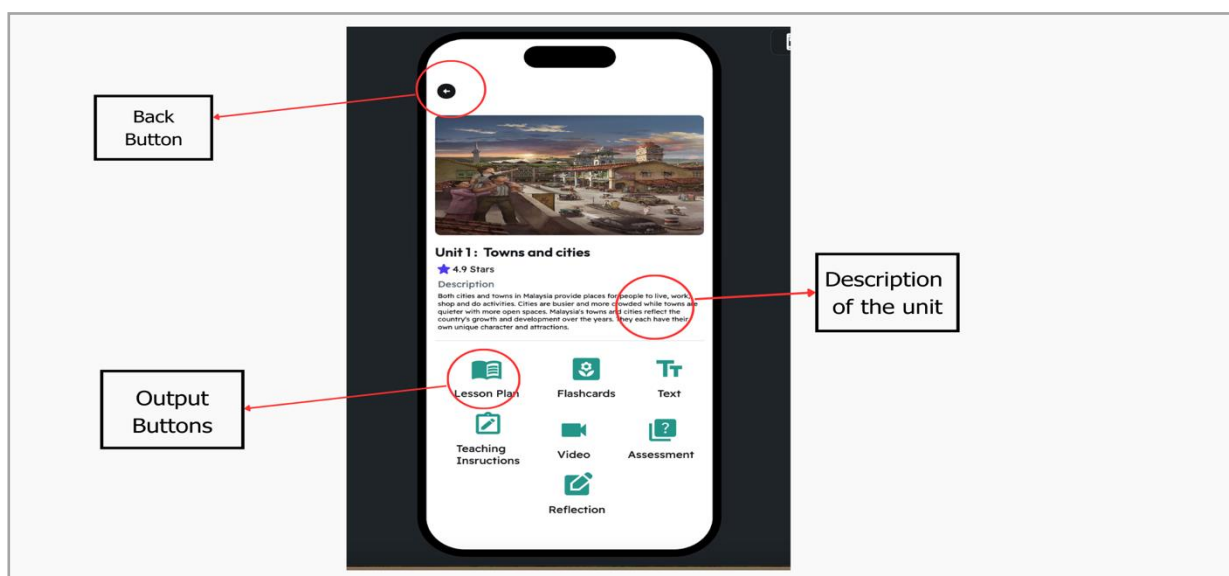


Figure 12. Screenshot of Output Components

The output components page in Figure 12 is the primary interface instructional unit for comprehensive components visualisation. The image generated by AI, according to the unit, is included in this page, as the content-validating expert suggested that more graphics should be included. A unit description has also been provided to facilitate teachers with the unit's overview. The output components are lesson plans, flashcards, reading text, teaching instructions, videos, assessments, and reflection. The interface buttons are strategically

designed to facilitate active engagement for teachers, serving as cognitive prompts that encourage users to interact purposefully with the content. These interactive elements function as navigational and exploratory mechanisms, motivating teachers to observe, access, and deeply explore the app's comprehensive resources. All the shared media will be stored in the Firebase storage, as shown in Figure 13.

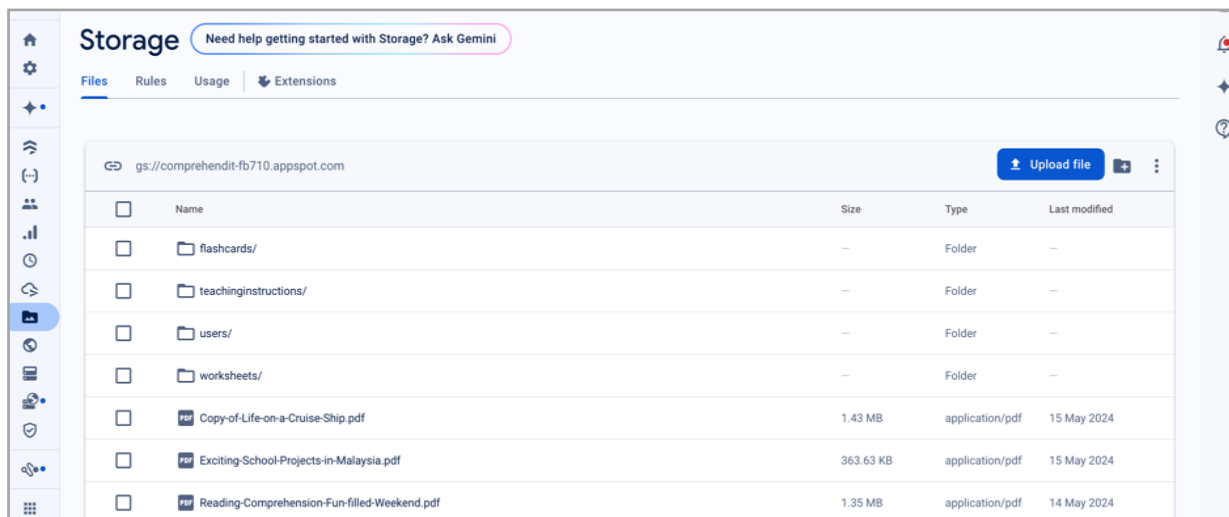


Figure 13. Snapshot of Firebase Storage

Firebase Storage is an extensive cloud storage service offered by Google as an integral component of the Firebase platform. It provides a dependable and expandable solution for storing and handling user-created information in mobile and online apps, such as photos, videos, and other binary files. Firebase Storage uses Google Cloud Storage, a cloud storage service that is both highly scalable and durable, to store content generated by users. Additionally, Firebase Storage offers Software Development Kits (SDKs) for several platforms, such as Android, ios, and the web. These SDKs allow for effortless integration with the application's coding.

### Implementation Phase

The implementation phase focuses on the practical implementation and deployment of the mobile application. At this phase, before the deployment to the target mobile platforms, such as the Play Store or Apple Store, depending on the users' types of gadget platforms, the researcher ran the test through GitHub software. Subsequently, the mobile app will be readied for deployment on the chosen platforms. This process could include packaging the software, obtaining the requisite developer accounts and licensing, and submitting the app to the relevant app stores, such as the Apple App Store and Google Play Store. Given the intricacies inherent in the mobile app deployment process, the researcher will deploy the actual apps on the platforms for data collection purposes. According to Aldoobie (2015), there are three steps which need to be considered for the implementation phase. This includes training the instructors, preparing the learners and organising the learning environment.

Besides that, user onboarding and training are crucial steps in the implementation phase. Considering the complexities of the mobile application, it may be necessary for the researchers to provide user onboarding and training resources to assist users in understanding how to utilise the application efficiently. According to the needs analysis,



teachers would prefer a course or an eBook for the instructional usability of the mobile app. For this reason, the researchers will provide online meetings and eBooks to guide the users.

Next, the implementation of preparing the learners refers to preparing the teachers with instructions developed for the application. After the online meeting and eBook are distributed among the teachers, the researcher will ensure that the teachers comprehend or inquire about any misunderstanding of the instructions provided for each stage in the lesson plan, suggested teaching instructions, vocabulary lists, and suggested answers for worksheets. Teachers should know how to deliver the lessons with the necessary materials from the resources.

The last step in the implementation phase is organising the learning environment. The researchers must ensure the teachers have the materials and knowledge to deliver the lesson for daily classroom lessons on reading comprehension. The teachers must also own a suitable gadget, internet connection, and downloaded or printed materials beforehand, if there are connectivity problems.

#### *Evaluation Phase*

According to Aldoobie (2015), two types of evaluation can be conducted in the evaluation phase as formative and summative. It involves gathering data to identify and rectify issues throughout the design and development phases. Formative evaluation enhances the content of educational materials and methods by making improvements before their finalisation. The basic processes of formative evaluation will involve some processes such as assessing the effectiveness of each material utilised, recognising their strengths and limitations, and working towards their improvement. The next process is evaluating the effectiveness and progress of the modifications made in the previous stage. Formative evaluation on trial in the field will involve setting up an environment that closely resembles the actual environment of the educational facility.

This study's formative evaluation of the prototype was conducted based on three experts of two senior lecturers in ESL with technology expertise, and one district officer with an ESL postgraduate qualification for technological innovation departments. Meanwhile, usability testing was conducted by three potential users as the usability testers. Usability testing assists in early recognition and resolution of issues with usability during the development process (Nielsen, 2012). The usability testers include instructional technology graduates, the subject matter of the district officer, and an ESL teacher as potential mobile app users. The evaluations are made through the evaluation of the user's feedback form to evaluate various aspects. Mobile app modifications were made based on the experts' feedback and usability testing feedback from potential users. Table 4 below shows a summary of the evaluation process for the evaluation phase.

Table 4

*Types of Evaluation and Purposes of Evaluation*

	Pre-prototype	Prototype 1 (Pilot Test)		App Deployment	Real Study
Purpose of Evaluation	One-to-one	User N=3	Expert N= 3	User N=20	User N= (Number of real study participants)
	Formative Evaluation	Formative Evaluation		Formative Evaluation	Summative Evaluation
Validity (Face & Content)	X		X		
Usability				X	X
Design	X	X	X		X
Functionality		X	X	X	X
Relevance		X	X		X

**Result**

The development of the mobile app based on the ADDIE framework yielded three key outcomes. Hence, the Analysis phase identified the critical gaps in the upper-primary ESL teachers' easily accessible reading comprehension teaching resources, which emphasise the app's focus on culturally CEFR-aligned materials. During the Design and Development phases, the iterative feedback from twelve upper-primary ESL teachers in the previous phase guided the app's outputs for pedagogically relevant and culturally appropriate teaching resources, such as teaching instructions, videos, and differentiated worksheets. Finally, the Evaluation phase revealed high usability ratings (90% overall score) from three potential users by validating the app's functional robustness. Three experts further confirmed that the AI-generated contents are aligned with CEFR standards (98% agreement) and instructional coherence (100% approval) for teaching integration for ESL teachers. This study shows that utilising the ADDIE approach with teacher feedback in designing AI collaboration leads to the development of tools that serve culturally diverse language classroom requirements effectively while adhering to educational standards.

**Conclusion**

Teachers' feedback, together with experts' validation, led to the development of the app, which potentially addresses the complex requirements of ESL reading comprehension education across various CEFR proficiency standards according to usability metrics and contextual appropriateness. The results are predicted to indicate that the mobile app is both technologically innovative and pedagogically relevant as a teaching resource for upper primary ESL teachers. This research showcases that the strategic integration of AI tools in the ADDIE framework would hold up well by developing an educationally successful mobile app. The study proves that the low-code platform FlutterFlow makes educational application development accessible to users who lack programming expertise in underserved educational environments. Hence, the AI-generated resource benefits from teachers directly co-creating its design under a participatory-based approach alongside the development process. The research puts forward a new combination of automated systems and human guidance according to recommendations in the current literature about ethical artificial intelligence in education.

## References

- Aji, C. A., & Santoso, H. B. (2020). The development of mobile learning media for introductory programming courses. *Jurnal Pendidikan IPA Indonesia*, 9(1), 1-11.
- Aldoobie, N. (2015). ADDIE model. *American International Journal of Contemporary Research*, 5(6), 68–72.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches* (4th ed.). Los Angeles, CA: Sage Publications.
- Domke, L., & Cerrato, M. (2024). Integrating Content and Language Instruction for Multilingual Learners: A Systematic Review Across Program Types. *Review of Educational Research*. <https://doi.org/10.3102/00346543241298667>.
- Fan, X., Liu, K., Wang, X., & Yu, J. (2023). Exploring Mobile Apps in English Learning. *Journal of Education, Humanities and Social Sciences*. <https://doi.org/10.54097/ehss.v8i.4996>.
- Gong, Y. (2021). Application of virtual reality teaching method and artificial intelligence technology in digital media art creation. *Ecological Informatics*, p. 63, 101304.
- Harry, A. (2023). Role of AI in Education. *Interdisciplinary Journal and Hummanity (INJURITY)*. <https://doi.org/10.58631/injury.v2i3.52>.
- Hasan, M., Islam, A., & Shuchi, I. (2021). USING MOBILE-BASED FORMATIVE ASSESSMENT IN ESL/EFL SPEAKING. , 9, 117-125. <https://doi.org/10.33394/JOLLT.V9I1.3449>.
- Hernandez, R., Garay-Argandoña, R., Alberto Núñez Lira, L., Fuster-Guillén, D., Paola Palacios Garay, J., & Ocaña-Fernandez, Y. (2021). Investigating instructors' and students' attitudes towards the effectiveness of having target cultural knowledge on learning English as a foreign language. *International Journal of Society, Culture & Language*, 9(3), 64-72.
- Huang, R. (2024). Enhancing Well-being and User Experience: Electric Sticky Notes, UI Design Colours, Login Preferences, and Clear Webpages. *Highlights in Science, Engineering and Technology*, pp. 85, 816–823.
- Knollman-Porter, K., Brown, J. A., Hux, K., Wallace, S. E., & Crittenden, A. (2022). Reading comprehension and processing time when people with aphasia use text-to-speech technology with personalised supports and features. *American Journal of Speech-Language Pathology*, 31(1), 342–358.
- Lim, F., & Toh, W. (2024). Apps For English Language Learning: A Systematic Review. *Teaching English With Technology*. <https://doi.org/10.56297/fsyb3031/gaqr3589>.
- Liu, W., Cao, Y., & Proctor, R. W. (2021). How do app icon colour and border shape influence visual search efficiency and user experience? Evidence from an eye-tracking study. *International Journal of Industrial Ergonomics*, p. 84, 103160.
- Manzoor, S., Jamil, H., & Nawaz, M. (2024). Technology Integration in ESL Classroom: Advantages and Challenges. *Volume 7 Issue 1*. <https://doi.org/10.36777/ijoltt2024.7.1.102>.
- Naushan, A., Rajanthran, S., Ali, A., & Moosa, D. (2023). Influence of Reading Strategies on ESL Students' Reading Comprehension in Secondary Schools in Malé, Maldives. *World Journal of English Language*. <https://doi.org/10.5430/wjel.v14n1p492>.
- Nielsen, J. (2012). Usability 101: Introduction to usability. Nielsen Norman Group.
- Perez, M. M. (2022). Second or foreign language learning through watching audio-visual input and the role of on-screen text. *Language Teaching*, 55(2), 163–192.
- Rahman, S., Razali, A., Samad, A., & Abdullah, N. (2022). Utilising Teaching Resources for the Development of Malaysian ESL Students' Sociolinguistic Competence. *International*

- Journal of Academic Research in Business and Social Sciences*.  
<https://doi.org/10.6007/ijarbss/v12-i5/13217>.
- Samsudin, M. R., Sulaiman, R., Guan, T. T., Yusof, A. M., & Yaacob, M. F. C. (2021). Mobile Application Development Through the ADDIE Model. *International Journal of Academic Research in Progressive Education and Development*, 10(2), 1017–1027.
- Sandesara M, Bodkhe U, Tanwar S, Alshehri MD, Sharma R, Neagu B-C, Grigoras G, Raboaca MS. Design and Experience of Mobile Applications: A Pilot Survey. *Mathematics*. 2022; 10(14):2380. <https://doi.org/10.3390/math10142380>
- Saputra, D., & Kania, R. (2022). Designing User Interface of a Mobile Learning Application by Using a Design Thinking Approach: A Case Study on UNI Course. *Journal of Marketing*, 2(2), 14-32.
- Shofi, A., & Jannah, W. (2022). Developing Mobile Learning Applications as Instructional Media for Reading Comprehension. *Al-Lisan*. <https://doi.org/10.30603/al.v7i2.2739>.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Yahaya, R. S., & Madzlan, N. A. (2021). ESL learners' obstacles in learning speaking skills. *The English Teacher*, 50(3).
- Yasmin, M., & Yasmeen, A. (2021). Viability of outcome-based education in teaching English as a second language to chemical engineering learners. *Education for Chemical Engineers*. <https://doi.org/10.1016/J.ECE.2021.04.005>.