

Design and Evaluation of an Inclusive Mobile Application for Enhancing English Learning Among Slow Learners in Sri Lankan Secondary Schools

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Abstract The integration of mobile applications into secondary education has gained traction in recent years, especially in English language learning. The "English Slow Learning App" was developed to enhance English language learning for slow learners in Sri Lanka by providing an inclusive, supportive digital environment. The app's design incorporates three roles: admin, teacher, and student, facilitating content management, quiz administration, and real-time performance tracking. Admins oversee the platform's operation, while teachers upload learning materials, and students engage with the content at their own pace. Methods involved building the app using Firebase and Android Studio for real-time data synchronization, user authentication, and interactive features. Evaluation results demonstrated improved engagement and performance among students, though user interface accessibility and content diversity were identified as areas for enhancement. Future developments include refining accessibility and expanding educational content to better meet user needs. Overall, the app shows significant potential to contribute to a more equitable and effective educational experience for slow learners in Sri Lanka.

Index Terms— Android Application Package, Application Programming Interface, English Learning, School Students, Secondary, Smartphone Application

I. INTRODUCTION

IN an increasingly globalized world, proficiency in the English language is essential for academic and professional success. However, for many slow learners in Sri Lanka, mastering English poses significant challenges due to a lack of tailored educational resources. Traditional classroom instruction often does not address the individual learning needs of these students, leading to frustration, reduced self-confidence, and disengagement from the learning process. These students are commonly taught by general subject teachers without specialization in English or inclusive educational practices, especially in grades 6 to 11, where the inconsistency in instruction further aggravates learning difficulties. English is not only a compulsory subject in secondary

education but also a foundational requirement for advanced education in Sri Lanka. Students often find English difficult due to inadequate tools and exposure, and the inability to grasp the language negatively impacts their performance in technical and

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practical subjects at higher educational levels. While private tutoring could offer a solution, it is unaffordable for many students from disadvantaged backgrounds, thereby perpetuating educational inequalities. To bridge this gap, mobile-assisted language learning (MALL) is gaining attention as a promising approach. Mobile technologies offer personalized, real-time, and interactive learning environments, which are more adaptable to the learning pace and styles of slow learners. Unfortunately, most existing educational apps lack features tailored to slow learners, such as simple interfaces, progress tracking, and feedback systems. This study presents the development and evaluation of the "English Slow Learning App," an inclusive mobile application designed specifically for slow learners of English in Sri Lanka. The application adopts a role-based access model involving three key user roles: admin, teacher, and student. Teachers can upload textbooks and learning materials, which students can access at their own pace. After studying, students' complete quizzes to assess their understanding. The system provides instant feedback, helping learners identify weak areas and request quiz retakes if necessary.

The objectives of the study are to investigate how existing English language learning apps address usability and accessibility for slow learners, Identify and analyze the specific challenges these learners face, Propose inclusive design guidelines for better educational app development. The scope includes students from grade 6 to 11 in Sri Lanka who struggle with English due to cognitive or pedagogical challenges. It addresses not just technical design but also pedagogical support

by incorporating real-time feedback, structured interaction, and inclusive interface features. Tools such as Firebase for real-time data and Android Studio for development were selected for their compatibility, scalability, and cost-effectiveness. What sets this app apart is its user-centered design, based on principles of Human-Computer Interaction (HCI), User Interface/User Experience (UI/UX) design, and pedagogical scaffolding. It draws on previous research that highlights the importance of accessible, responsive, and localized tools to engage slow learners effectively. Additionally, a pilot study involving 50 students and 10 teachers was conducted to assess the impact of the app. Preliminary findings indicated improvements in user engagement, quiz performance, and overall satisfaction. Teachers also reported easier tracking of student progress and higher levels of classroom participation among app users.

This study does not only aim to offer a practical solution but also contributes theoretically to the growing field of inclusive Ed Tech (educational technology). It demonstrates how mobile learning, when designed with empathy and evidence, can help slow learners overcome educational barriers. Moreover, it serves as a model for similar interventions in other developing regions with comparable educational challenges. In summary, the “English Slow Learning App” represents an intersection of inclusive design, educational theory, and technological innovation. It reflects an urgent need to reform how we support marginalized learners and affirms that technology-when thoughtfully applied- can be a transformative force in education.

II. LITERATURE REVIEW

A. The Potential and Pitfalls of Mobile-Assisted Language Learning (MALL)

The integration of mobile applications into secondary education has gained significant traction, particularly in the domain of English language learning. In contexts like Sri Lanka, where smartphone accessibility is increasing, Android-based MALL tools present a pragmatic solution for enhancing language acquisition (Santosa et al., 2020). The theoretical underpinning of this approach, Mobile-Assisted Language Learning (MALL), emphasises learning that is flexible, interactive, and autonomous, allowing students to learn at their own pace (Kacetyl and Klímová, 2019).

A consistent finding across the literature is that the efficacy of these tools is critically dependent on their usability. As Ishaq et al. (2020) rigorously demonstrate, usability is not a secondary feature but a primary determinant of educational software's effectiveness. This is supported by Chakravarthy and Sunita (2023), whose review found that well-designed apps can significantly enhance specific skills like reading. However, this potential is often tempered by issues of engagement and design inclusivity. For instance, Klímová and Berger's (2018) case study, while noting the general effectiveness of vocabulary apps, crucially observed a common pitfall: a lack of long-term engagement, suggesting that many apps fail to sustain learner motivation beyond initial novelty.

This gap between potential and practice becomes even more pronounced when considering the learning preferences of younger, digital-native generations. Research by Poláková and

Klímová (2019) indicates that Generation Z learners expect user-friendly, responsive, and interactive digital experiences, expectations that are frequently unmet by educational apps designed for a generic user base. Therefore, while the MALL paradigm holds great promise, the existing landscape is characterised by tools that often possess foundational flaws in usability and sustained engagement, limiting their real-world impact.

B. Identifying the Critical Gap: Inclusive Design for Slow Learners

A major shortcoming in the current body of research is the relative neglect of specific learner demographics, particularly slow learners. While studies like those from Wang and Han (2021) showcase the success of game-based apps in improving oral production for the general student population, they often fail to account for the unique cognitive and functional challenges faced by slow learners. These students commonly experience difficulties with retention, comprehension, and may even have motor impairments that make standard app interfaces difficult to use (Deris and Shukor, 2019). The need for specialized design is underscored by research into pronunciation training; for example, Fouz-González (2020) found apps beneficial for general pronunciation, but such tools typically lack the repetitive, multimodal, and highly scaffolded practice that slow learners require for mastery, a point emphasised by Jarosz (2019).

The role of the teacher in mediating technology use is another dimension frequently underdeveloped in existing MALL applications. Ulla et al. (2020) rightly argue that teacher involvement is critical for providing feedback and monitoring progress, especially for vulnerable groups. Yet, few apps integrate features such as role-based access for teachers, adaptive quiz retakes, or detailed progress tracking that would enable this supportive scaffolding (Bourekache and Kazar, 2020). This highlights a disconnect between technological capability and pedagogical need.

Furthermore, the development of these tools often occurs without a culturally relevant framework. Abdi and Makiabadi (2019) note the scarcity of research on integrating assistive technology within specific socio-cultural contexts, such as for underprivileged students in countries like Sri Lanka. This absence means that even well-intentioned apps may not resonate with or be fully accessible to the target audience.

The theoretical frameworks of Constructivism and Universal Design for Learning (UDL) offer a path forward. Constructivism aligns with interactive app features that allow knowledge construction through doing (Klímová, 2019), while UDL explicitly calls for multiple means of engagement, representation, and expression to cater to diverse learners (Alsanousi et al., 2023). However, a synthesis of the literature reveals that few existing MALL solutions successfully operationalise these principles to create structured, culturally adapted, and teacher-supported environments for slow learners.

In conclusion, while prior research establishes the broad efficacy of MALL and identifies key success factors like usability, it largely overlooks the intricate design requirements for inclusive education. The distinct contribution of this study

is, therefore, the development and evaluation of the "English Slow Learning App"- a tool designed to bridge this gap by embedding the principles of UDL and constructivist pedagogy within a context-aware, teacher-integrated platform specifically tailored for slow learners in the Sri Lankan secondary education system.

III.METHODOLOGY

The methodology for developing and evaluating the "English Slow Learning App" followed a systematic, multi-phase approach intended to address the specific educational needs of slow learners in Sri Lanka. The process began with an in-depth requirements analysis, including stakeholder consultations with students, educators, and educational experts. These interactions helped identify the key challenges slow learners face in English language acquisition and guided the definition of the app's core functionalities and project goals. Once the requirements were established, the project progressed to the design phase, which focused on creating a user-centric interface. The layout, content structure, and navigation were specifically developed to suit slow learners. Interactive features like quizzes and feedback were included to enhance engagement. Prototypes were developed using Figma, and user testing sessions were conducted to gather feedback for iterative improvements.

The app was developed using Android Studio, leveraging Firebase as the backend for real-time data management, user authentication, and storage. XML and Java were used for front-end development. The app architecture supported role-based access for three types of users: admin, teacher, and student. The admin managed user registration monitored content and quiz results and ensured the integrity of the system. Teachers uploaded notes, created quizzes, and tracked student progress, while students accessed study materials, attempted quizzes, and received real-time feedback.

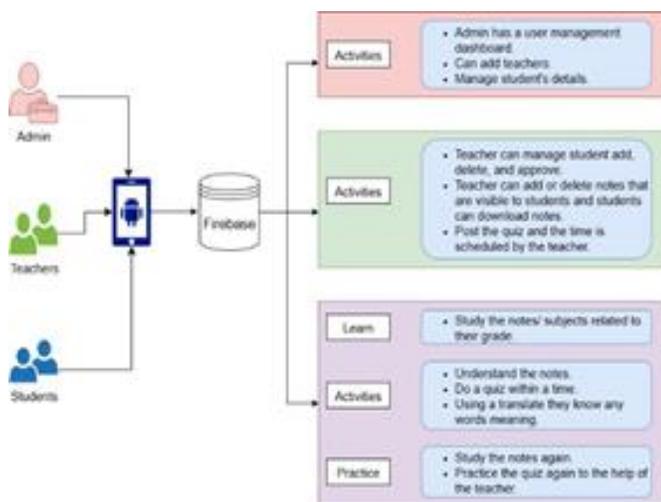


Fig. 1: System Architecture

A pilot study was conducted involving 50 students aged 12–18 and 10 teachers. Data collection methods included pre- and post-tests, surveys, and interviews to assess the app's effectiveness. Surveys evaluated user satisfaction and

engagement, while interviews with teachers provided insight into classroom applicability. Both quantitative and qualitative data were analyzed using statistical and thematic techniques, respectively, to measure learning improvements and identify usability trends. The results informed subsequent refinement to the application. The methodology adopted ensured that the app was developed and validated through an evidence-based process, aiming to deliver a practical, inclusive solution that supports English learning for slow learners in Sri Lanka.

IV.RESULTS AND DISCUSSION

The "English Slow Learning App" was developed and implemented using Android Studio and Firebase to support English learning among slow learners in Sri Lanka. The system was divided into three primary user modules-Admin, Teacher, and Student-each tailored with specific functionalities to streamline the teaching and learning process. These results reflect both the technical implementation and educational effectiveness of the application, as observed through practical testing, user feedback, and comparative analysis with existing language learning systems.

A. Admin Module Results

The Admin App was designed for school principals or IT administrators responsible for managing system operations. The login screen utilizes Firebase Authentication, which allows secure access using admin credentials. Upon successful login, the admin is presented with a dashboard to manage both student and teacher accounts. The functionality includes adding, updating, or deleting student records, along with verifying user access to the system. Administrators also manage teacher records in a similar manner, including verification steps that ensure only approved instructors have access to the teaching features. A password reset function allows admins to restore access through Firebase's secure reset process. These features allow for smooth user account administration and prevent unauthorized access. The admin's role extends to monitoring uploaded materials, tracking quiz results, and generating student progress reports, offering a centralized control mechanism that ensures consistent educational delivery.

B. Teacher Module Results

The Teacher App allows instructors to manage their digital classrooms by creating and maintaining student records specific to their classes. Teachers can upload syllabi, add instructional notes, and create quizzes, making learning content readily accessible to students. As part of the content management system, teachers are given a clean, intuitive dashboard to input and organize materials according to grade and subject.

The teacher screen, as demonstrated in Figure 3, provides educators with various functionalities, including "Manage Students" interface to the ability to approve students, view quiz performances, and take corrective actions based on real-time analytics. Teachers can also add or update notes and syllabus sections, which are then published to the student app, allowing them to adapt materials according to classroom needs.



Fig. 2: Teacher Screen

Additionally, the system includes a quiz management section where teachers can input questions, set time limits, and review results after submission. Educators found the interface intuitive, particularly appreciating the option to retest students selectively—a crucial feature for supporting slow learners who benefit from repeated content exposure.

C. Student Module Results

The Student App serves as the primary interface for learners to engage with course materials. Students can access syllabus notes, organized by grade, and download them for offline study. The student dashboard presents learning resources in a structured format, enhancing accessibility and reducing confusion—particularly for slow learners who may struggle with navigating digital content. Additionally, students can view detailed notes and syllabi, ensuring clarity and ease of use.

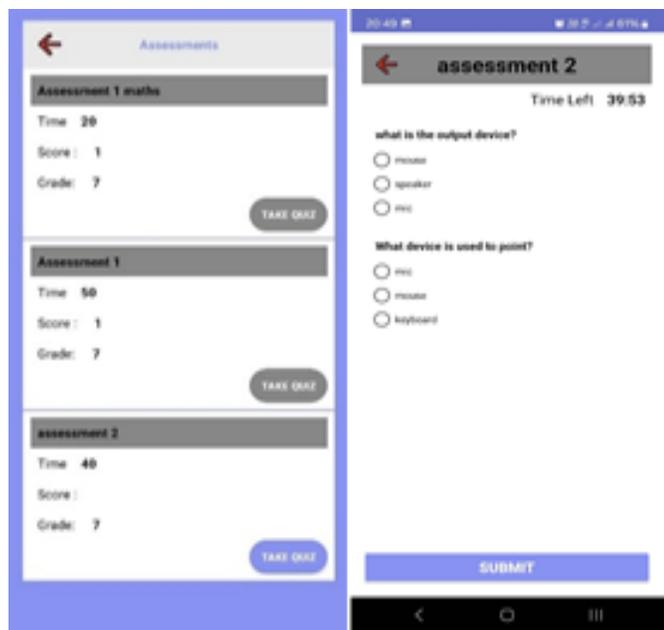


Fig. 3: Quiz Interface and Participation

Students also participate in time-bound quizzes created by their teachers. After completion, immediate feedback is provided, as depicted in Figure 4. This feature displays correct answers and indicates incorrect responses, allowing students to identify their weaknesses without delay. This feedback loop was particularly effective for building confidence and retention among slow learners. Some students reported feeling encouraged by the transparency and simplicity of the grading system, motivating them to retry and improve their scores.

D. System Integration and Interface Design

The system’s backend, built on Firebase, allows for seamless data synchronization. Quiz results, student progress, and teacher content updates are reflected in real-time across user devices. Firebase Authentication ensures secure logins, while the Firestore database organizes user data, quiz records, and educational content in structured collections.

The design was built around a client-server model with Android Studio. The user interface was developed with simplicity in mind to reduce cognitive load, an important consideration for slow learners. UI elements such as large buttons, grade-specific navigation, and color-coded categories were incorporated into the Figma-based design before deployment. Prototypes for each module Admin, Teacher, and Student layouts were presented and refined based on pilot user feedback. As shown in Figure 5, the finalized Student Module Prototype demonstrates the intuitive design implemented for learners.



Fig. 4: Student Module Prototype

E. Pilot Study and User Feedback

A pilot study was conducted with 50 students aged 12–18 and 10 English teachers. Pre-tests were conducted to evaluate the students’ baseline performance in English. Following a learning period using the app, post-tests were administered. Results indicated a measurable improvement in vocabulary, comprehension, and quiz scores among students who actively used the app. Students reported that they appreciated the structured presentation of content, real-time quiz feedback, and the option to retake assessments. Teachers stated that the app improved their ability to monitor individual student progress and allowed for quicker intervention when performance

dropped. Admins highlighted the benefits of centralized data and real-time control over the platform's functionality. Surveys confirmed a high level of satisfaction among all user groups. While 92% of students rated the app "helpful" or "very helpful," teachers rated the app's functionality and ease of content upload at over 85% satisfaction. The only noted drawback was the limited content diversity, with teachers requesting the inclusion of listening and speaking modules in future versions.

The project also conducted a comparative analysis of similar mobile English learning applications, including Duolingo, Babbel, and Rosetta Stone. Duolingo, known for its gamified environment, lacks custom quiz control and offers limited interaction with teachers. Babbel requires paid access for full content and has minimal inclusivity features. Rosetta stone is immersive but is cost-prohibitive and not regionally contextualized.

As summarized in Table 1, the English Slow Learning App provided a unique balance of features such as strong accessibility, real-time teacher-student interaction, and full admin control. Its free access and targeted focus on slow learners offer a competitive edge over mainstream applications.

TABLE I
SUMMARIZE TABLE

Feature	Duolingo	Babbel	Rosetta Stone	Proposed App
Accessibility	Limited	Moderate	Limited	Strong
Real-time Feedback	No	Yes	No	Yes
Role-based User System	No	No	No	Yes
Teacher Interaction	No	No	No	Yes
Local Language Content	No	No	No	Yes
Free for Students	Partial	No	No	Yes

F. Challenges and Observations

During implementation and testing, some limitations were observed. The app currently does not support offline access, which poses a barrier in low-connectivity regions. Furthermore, while reading and quiz functions are robust, audio and speaking exercises are not yet included, which would be beneficial for language pronunciation and fluency development.

Another noted challenge was user onboarding. Some students initially found it difficult to register and navigate the app, though this was mitigated through teacher support and UI refinement. Teachers also indicated the need for additional

filters and analytics to sort students by performance tiers for easier classroom management. The educational system created through this app contributed to enhancing engagement, accountability, and inclusiveness among students traditionally marginalized in digital learning environments. Teachers gained tools for scalable content delivery and performance monitoring, while admins could enforce quality control and compliance. As a holistic solution, the "English Slow Learning App" demonstrated the value of custom-built, role-based educational platforms for specific learner categories.

V. CONCLUSION AND RECOMMENDATIONS

The English Slow Learning App makes its key contribution by offering a tailored, technology-driven solution for a traditionally underserved group: slow learners in English. Its core achievement lies in providing a structured, role-based platform that minimizes cognitive load through an intuitive interface and promotes independent learning with immediate quiz feedback, thereby directly addressing the unique needs of its target users. The app's practical implications are significant across the educational ecosystem. For students, it establishes a supportive, self-paced environment that builds confidence and clarifies their learning journey. For teachers, it serves as an effective management tool, enabling efficient tracking of student progress and customization of learning materials. For policymakers, it demonstrates a scalable model for advancing inclusive education, particularly in resource-conscious, multilingual contexts such as Sri Lanka. Nevertheless, the project has identifiable limitations that suggest clear directions for future research and development. The current system lacks advanced data analytics for predictive insights and real-time communication tools for direct support. Future work should therefore prioritize integrating these features, while also exploring multi-language support, enhanced security protocols, and cross-platform accessibility to further extend the app's reach, impact, and overall effectiveness.

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