ReadTech: A Mobile Reading Application for Grade 7 Learners

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***Abstract*—Reading comprehension remains a fundamental skill for academic success; however, many Grade 7 learners continue to experience difficulties in vocabulary development, text comprehension, and access to engaging instructional materials. This study developed and evaluated the ReadTech Mobile Reading Application using a Design and Development Research (DDR) methodology. The study integrated developmental, descriptive-survey, and evaluative approaches involving Grade 7 learners, expert validators, and student-users from two integrated schools in Asingan, Pangasinan, Philippines. Needs assessment results revealed that learners had a strong need for supplementary reading materials, vocabulary-building activities, and technology-supported learning resources. The developed application incorporates personalized learning activities, reading lessons, assessments, and progress monitoring features aligned with the Grade 7 English MATATAG Curriculum. Expert evaluation indicated that the application was highly valid (M = 4.71), particularly in task accuracy and technology usability. Likewise, student-users rated the application as highly acceptable (M = 4.47), with engagement receiving the highest rating. These findings indicate that ReadTech is a curriculum-aligned mobile learning application that was successfully developed, validated by experts, and positively received by learners. The study demonstrates the feasibility of using Design and Development Research (DDR) to develop learner-centered mobile applications that support reading instruction and provide a foundation for future studies evaluating learning outcomes.**

Keywords*—Android application; digital learning; educational technology; mobile learning; reading comprehension

I. Introduction

Reading comprehension is a fundamental component of literacy that enables learners to derive meaning from texts, acquire knowledge, develop critical thinking skills, and achieve academic success. As one of the core competencies in language education, reading comprehension supports learning across various subject areas and contributes significantly to students' overall educational development. However, many learners continue to experience difficulties in understanding textual information, identifying main ideas, making inferences, interpreting vocabulary, and synthesizing information from different reading materials. These challenges often hinder academic performance and reduce learners' confidence and motivation toward reading activities [1], [2].

The rapid advancement of digital technology has transformed the way learners access, process, and interact with information. Mobile devices, particularly smartphones and tablets, have become increasingly integrated into students' daily lives, providing opportunities for learning beyond traditional classroom environments. Consequently, mobile learning has emerged as an effective educational approach that enables learners to access instructional materials anytime, anywhere via portable devices. Research has shown that Mobile Reading Applications can support language acquisition, improve learner engagement, and provide flexible learning experiences that accommodate individual learning needs [3], [4].

The effectiveness of educational Mobile Reading Applications depends largely on how well they address the needs and preferences of their intended users. Human-centered design emphasizes the importance of understanding learners' characteristics and involving users throughout the development process to ensure that educational technologies remain relevant, usable, and effective. Educational applications designed using learner-centered approaches are more likely to enhance user satisfaction, motivation, and learning outcomes because they align instructional content with students' cognitive and behavioral requirements [5], [6].

An important aspect of educational application development involves the use of systematic design methodologies. Storytelling techniques, storyboards, and user-experience frameworks have been widely utilized to visualize learning scenarios and facilitate communication among developers, educators, and stakeholders during the design process. These methods contribute to the creation of intuitive interfaces and meaningful learning experiences that support instructional objectives and learner engagement [7], [8].

Similarly, wireframing and interface design practices play a critical role in ensuring the usability and accessibility of mobile learning applications. Effective interface design enables users to navigate learning materials efficiently while minimizing cognitive overload. Well-designed interfaces can improve learner interaction with digital content, thereby increasing the likelihood of sustained engagement and positive learning experiences [9], [10].

Prototyping has likewise become a fundamental practice in educational technology development because it allows developers to iteratively refine application features based on stakeholder feedback. Evolutionary prototyping approaches facilitate continuous improvement by enabling developers to evaluate and modify application components throughout the development cycle. Such approaches have been successfully applied in the development of educational and decision-support systems, resulting in improved functionality and user satisfaction [11], [12].

The collaborative involvement of subject matter experts is also essential in ensuring the quality and educational relevance

of instructional applications. Experts contribute specialized knowledge that guides content development, instructional design, and assessment construction. Collaboration between developers and subject matter experts helps ensure that learning materials are accurate, pedagogically sound, and aligned with curricular standards and learning objectives [13], [14].

In addition to content quality, educational Mobile Reading Applications must be developed using appropriate instructional design principles. Effective instructional design promotes active learning, supports learner autonomy, and provides opportunities for practice and feedback. Applications that incorporate structured learning pathways, clear objectives, and meaningful reinforcement activities are more likely to facilitate knowledge acquisition and skill development among learners [15], [16].

The increasing use of smartphones for educational purposes has generated considerable interest in understanding how digital reading environments influence reading comprehension and learning performance. While mobile technologies provide convenient access to educational resources, researchers have observed differences in how learners process information presented on digital screens compared with traditional printed materials. These differences have raised questions regarding the effectiveness of digital reading platforms in supporting deep comprehension and knowledge retention [17], [18].

Studies examining reading performance across digital and print media have produced varied findings. Some investigations suggest that learners may demonstrate lower comprehension performance when reading digitally, particularly when texts require deeper cognitive processing and reflection. Other studies indicate that appropriately designed digital environments can support reading comprehension by incorporating interactive features, multimedia elements, and adaptive learning supports that enhance learner engagement and understanding [19], [20].

Eye-tracking technology has emerged as an important tool for examining reading behavior in digital learning environments. Through the analysis of visual attention, fixation patterns, and reading navigation behaviors, researchers have gained valuable insights into how learners interact with electronic texts. Eye-tracking studies have contributed significantly to understanding the cognitive processes involved in reading and learning from digital materials [21], [22].

Research further indicates that reading behaviors differ depending on the design and presentation of digital content. Factors such as multimedia integration, visual layout, navigation structures, and interactive features influence learners' attention and information processing. Well-designed digital reading environments can enhance engagement and facilitate comprehension by directing learners' attention toward relevant content and supporting cognitive processing [23], [24].

The incorporation of multimedia features in educational applications has also shown promise in promoting learner motivation and reading engagement. Interactive activities, audio support, visual cues, gamification elements, and immediate feedback mechanisms can make learning experiences more engaging and meaningful. Such features help learners remain actively involved in learning tasks while supporting diverse learning preferences and abilities [25], [26].

Recent studies utilizing eye-tracking methodologies have demonstrated that visual cues and multimedia supports can significantly influence learners' reading performance and attention allocation. These findings suggest that carefully designed digital reading tools can improve learners' ability to process information and maintain focus during reading activities. Consequently, educational applications that integrate evidence-based multimedia features may contribute positively to reading comprehension development [27], [28].

Beyond visual attention, researchers have also examined learners' cognitive engagement while reading digital texts. Findings indicate that digital reading experiences involve complex interactions among cognitive, behavioral, and physiological factors. Understanding these interactions is important for designing educational technologies that effectively support reading comprehension and learning outcomes [29], [30].

The growing body of literature on mobile learning, digital reading, and educational technology highlights the importance of developing applications that balance instructional effectiveness with usability and learner engagement. Educational technologies should not only provide access to content but also facilitate meaningful interactions that promote comprehension, vocabulary development, critical thinking, and independent learning [31], [32].

Within the Philippine educational context, strengthening reading comprehension remains a significant concern. Reading proficiency serves as a foundation for learning across disciplines, yet many learners continue to encounter challenges in comprehension, vocabulary acquisition, and critical reading. The implementation of the MATATAG Curriculum further emphasizes the need for innovative and technology-supported instructional resources capable of enhancing literacy development among secondary school learners [33], [34].

Despite the availability of numerous educational applications, there remains a need for curriculum-aligned mobile reading applications specifically designed to address the learning needs, reading attributes, and preferences of Grade 7 learners. Existing applications often focus on general language learning and may not adequately provide structured reading comprehension activities, vocabulary development opportunities, progress monitoring features, and interactive support mechanisms that align with curriculum requirements [35], [36].

Moreover, the effectiveness of educational technologies must be established through systematic evaluation procedures. Expert validation is necessary to ensure content quality, instructional accuracy, usability, and technological reliability, while user acceptability assessments provide insights into learners' perceptions regarding functionality, engagement, usefulness, and overall learning experience. Such evaluations are essential for determining whether an educational application successfully meets its intended objectives and supports meaningful learning outcomes [37], [38].

Although numerous mobile learning applications have been developed for language education, relatively few are specifically aligned with the Philippine Grade 7 English MATATAG

Curriculum while integrating learner needs assessment, expert validation, and student acceptability evaluation within a Design and Development Research framework. Consequently, there remains a need for a curriculum-based mobile reading application whose development is systematically guided by learners' instructional needs and evaluated for its educational quality and usability.

In response to these educational needs, this study aims to develop and evaluate the ReadTech Mobile Reading Application as a digital learning tool designed to enhance the reading comprehension skills of Grade 7 learners. Specifically, this study aimed to identify the reading attributes, learning preferences, and reading needs of Grade 7 learners; develop the ReadTech Mobile Reading Application based on the identified learner needs and the Grade 7 English MATATAG Curriculum; evaluate the application in terms of content quality, task accuracy, instructional design, and technology usability through expert validation; determine the acceptability of the application among student-users in terms of usability, functionality, engagement, and usefulness; and identify recommendations for improving future versions of the application.

II. METHODOLOGY

A. Research Design

This study employed a Design and Development Research (DDR) methodology [39] to develop and evaluate the ReadTech Mobile Reading Application for Grade 7 learners. The methodology integrated developmental, descriptive-survey, and evaluative approaches. The developmental phase focused on the design, development, and refinement of the application, while the descriptive-survey phase identified learners' reading needs and preferences that served as the basis for application development. The evaluative phase examined the application's validity, usability, and acceptability. The study was conducted in two integrated schools in Asingan, Pangasinan, Philippines, selected for their Grade 7 learner population. Using purposive sampling, the participants included Grade 7 learners for the needs assessment, expert validators for application evaluation, and student-users who assessed the application's functionality, engagement, and usefulness following implementation.

B. Statistical Treatment of Data

Descriptive statistics, including frequency, percentage, weighted mean, and grand mean, were used to summarize the needs assessment, expert validation, and student acceptability results. Since the purpose of the study was to evaluate the developed application rather than determine causal effects or learning gains, inferential statistical analyses were not performed. Tables I and II present the interpretation scales used in the study.

Mean scores ranging from 4.21–5.00 indicate Highly Needed, while lower mean scores correspond to decreasing levels of need, from Needed to Not Needed. This scale was used to determine the priority needs of Grade 7 learners.

Mean scores of 4.21–5.00 indicate Highly Valid/Highly Acceptable, while lower scores reflect decreasing levels of validity and acceptability, from Valid/Acceptable to Not Valid/Not Acceptable. This scale was used to evaluate the quality and usability of the ReadTech Mobile Reading Application.

TABLE I. NEEDS ASSESSMENT SCALE

Mean Range	Interpretation
4.21–5.00	Highly Needed
3.41–4.20	Needed
2.61–3.40	Moderately Needed
1.81–2.60	Slightly Needed
1.00–1.80	Not Needed

TABLE II. VALIDITY AND ACCEPTABILITY SCALE

Mean Range	Interpretation
4.21–5.00	Highly Valid / Highly Acceptable
3.41–4.20	Valid / Acceptable
2.61–3.40	Moderately Valid / Moderately Acceptable
1.81–2.60	Slightly Valid / Slightly Acceptable
1.00–1.80	Not Valid / Not Acceptable

C. Learners' Reading Attributes

The needs assessment was conducted to determine the needs of supplemental learning and the basis for the development of a mobile reading application. The results are presented in Table III, which presents the summary of learners' reading attributes.

TABLE III. READING ATTRIBUTES OF GRADE 7 LEARNERS

Indicator	Mean
Identifying the main idea	5.00
Understanding details of a text	4.97
Making inferences	4.74
Understanding unfamiliar vocabulary	5.00
Summarizing ideas	5.00
Analyzing different text types	5.00
Activities that improve reading comprehension	4.91
Strategies that help become a better reader	5.00
Grand Mean	4.95

The results show a grand mean of 4.95, interpreted as Highly Needed, indicating a very high need to develop essential reading skills. Among the indicators, identifying the main idea, understanding unfamiliar vocabulary, summarizing ideas, analyzing different text types, and strategies that help become a better reader obtained the highest mean of 5.00, while making inferences received the lowest mean of 4.74, though it remained within the Highly Needed level. These findings highlight the importance of strengthening fundamental reading competencies in the development of the ReadTech Mobile Reading Application.

D. Reading Needs

The reading needs were conducted to determine the needs of supplemental learning and basis for the development of the mobile reading application. The results are presented in Table

IV, which presents the summary of reading needs of Grade 7 learners.

TABLE IV. READING NEEDS OF GRADE 7 LEARNERS

Indicator	Mean
Additional reading materials	4.94
Vocabulary-building activities	4.91
Gradually increasing difficulty levels	4.87
Reading comprehension exercises	4.91
Critical thinking activities	4.83
MATATAG-aligned materials	4.98
Word of the Day feature	4.87
Multiple reading genres	4.92
Grand Mean	4.90

The results yielded a grand mean of 4.90, interpreted as Highly Needed, indicating a strong demand for additional reading resources and learning support. Among the indicators, MATATAG-aligned materials obtained the highest mean (4.98), followed by additional reading materials (4.94) and multiple reading genres (4.92). Although critical thinking activities recorded the lowest mean (4.83), it remained within the Highly Needed level. These findings emphasize the importance of providing curriculum-aligned, engaging, and comprehensive reading materials in the ReadTech Mobile Reading Application.

E. System Architecture of the Mobile Reading Application

Fig. 1 illustrates the overall architecture and operational workflow of the mobile reading application developed to support reading comprehension among Grade 7 learners.

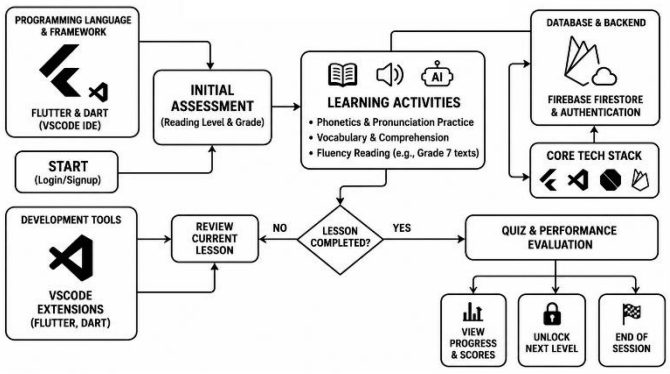

Fig. 1. Architecture and operational flow of the mobile reading application.

The process begins with the Start module, where learners create an account or log in to the application. After authentication, learners undergo an Initial Assessment that determines their reading level and appropriate grade-based content. Based on the assessment results, the system provides personalized Learning Activities, which include phonetics and pronunciation exercises, vocabulary and reading comprehension activities, and fluency-reading exercises using Grade 7 texts. After completing the learning activities, the system evaluates whether the lesson has been completed. If the learner has not completed the lesson, the application redirects the learner to the Review Current Lesson module to reinforce understanding and improve mastery. If the lesson is completed, the learner proceeds to the Quiz and Performance Evaluation stage, where the application measures learning outcomes and reading performance. The evaluation results are then stored in the Firebase database and presented through several features, including Progress and Score Monitoring, Unlocking of Subsequent Learning Levels, and the End-of-Session module. This workflow enables personalized learning, continuous progress monitoring, and adaptive reading instruction, thereby promoting reading comprehension, vocabulary development, and independent learning among Grade 7 learners.

F. Pseudocode of the ReadTech Mobile Reading Application

Algorithm 1 presents the pseudocode for the development and deployment process of the ReadTech Mobile Reading Application.

Algorithm 1: ReadTech Mobile Reading Application

```
Initialize
  Configure Flutter Framework
  Configure Dart Programming Language
  Configure VSCode Development Environment
  Configure Firebase Firestore and Authentication
  Define application requirements and database schema
Compute
  Collect learners' reading needs
  Analyze learning preferences and digital learning needs
  Design application architecture and user interfaces
While (application development is not completed) do
  For (each application module) do
    Develop Authentication Module
    Develop Initial Assessment Module
    Develop Learning Activity Module
    Develop Quiz and Evaluation Module
    Develop Progress Monitoring Module
    Develop Level Unlocking Module
    Update
      Integrate module with Firebase database
      Test module functionality and user interface
      If (errors or usability issues exist) then
        Debug and revise source code
        Update database and interface design
        Re-test module
      End
  End

  Validate
    Conduct expert evaluation
    Analyze validation results
    If (recommendations are provided) then
      Revise application features and content
      Re-evaluate application
    End
End
Deploy
  Release application to student-users
  Collect acceptability evaluation
  Analyze user feedback
  Finalize and publish ReadTech Mobile Application
```

The algorithm describes the major procedures involved in configuring the development environment, designing and

implementing application modules, integrating the database and backend services, conducting testing and validation, and deploying the application to student-users. It also illustrates the iterative process of debugging, refinement, and evaluation to ensure that the application meets the educational and technological requirements of Grade 7 learners.

G. Ethical Consideration

The study adhered to established ethical standards in educational research. Participation was voluntary, and informed consent was obtained from all participants and their parents or guardians. Confidentiality and anonymity were maintained, and all data were used solely for academic and research purposes. Participants were informed of their right to withdraw from the study at any stage without penalty.

III. Results and Discussions

A. The Developed ReadTech Mobile Reading Application

The following figures illustrate the user interfaces of the mobile reading application. The first screen shows the splash screen, which serves as the application's loading and welcome interface. The second and third screens display the activity dashboards containing curriculum-aligned reading exercises and assessments organized by academic quarter.

Fig. 2 presents the splash screen and main menu of the ReadTech Mobile Reading Application, providing learners with access to lessons, activities, and personalized learning features.

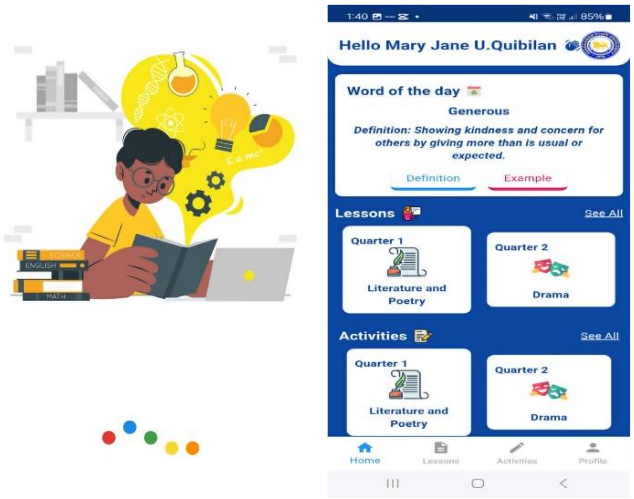

Fig. 2. The splash screen and main menu.

Fig. 3 illustrates the introductory lesson interface, which presents sample lessons and guides learners through the available instructional content.

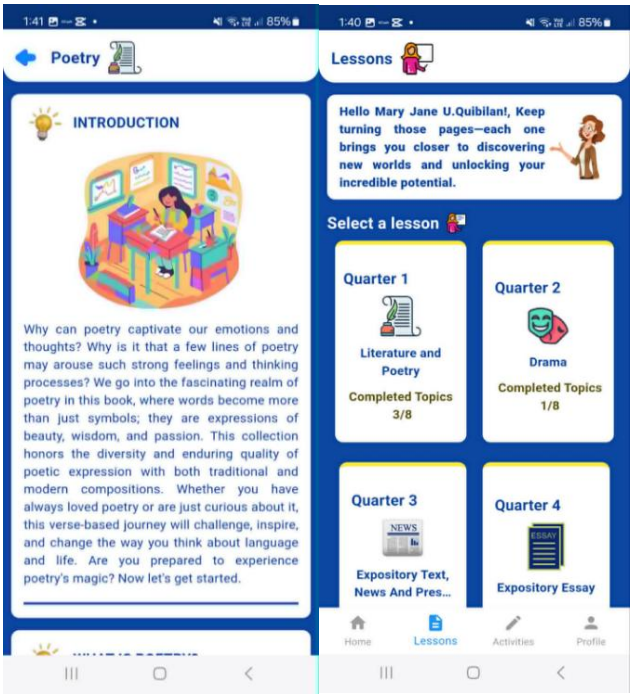

Fig. 3. The sample lessons introduction.

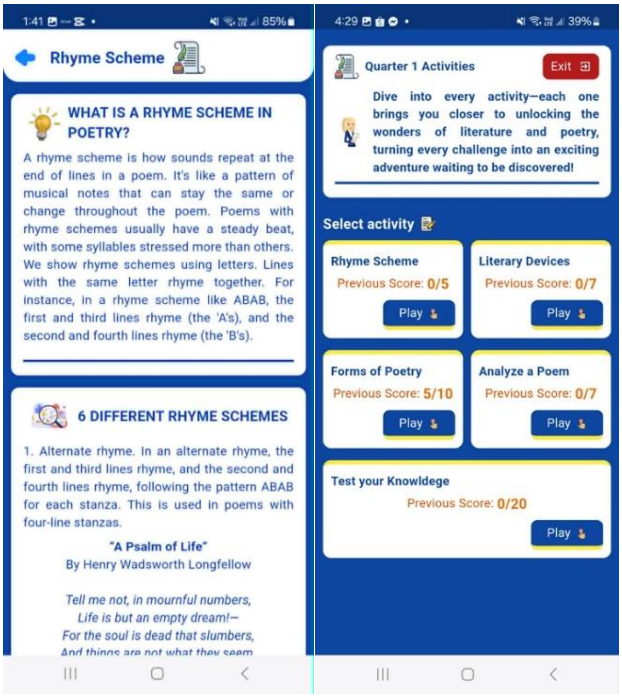

Fig. 4. The poetry lessons and rhyme scheme.

Fig. 4 presents the Poetry Lessons and Rhyme Scheme, which introduces rhyme schemes that guide the learners to different rhyme schemes.

Fig. 5. The literary devices lesson screen.

Fig. 5 presents the Literary Devices lesson screen, which introduces figures of speech and develops learners' interpretation of figurative language.

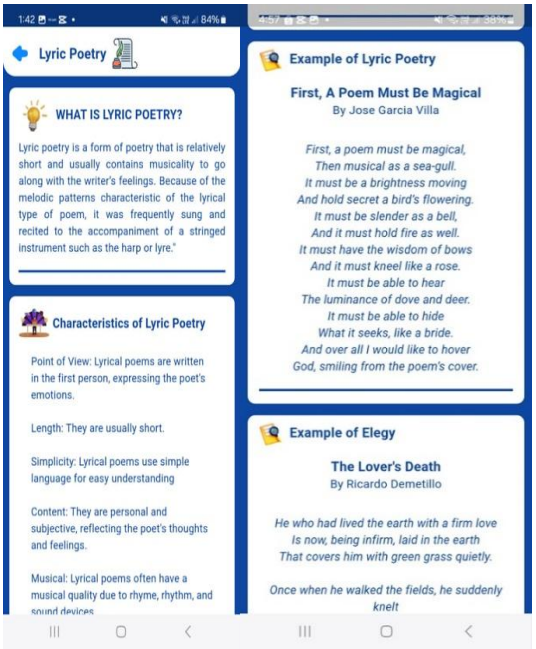

Fig. 6. The lyric poetry lesson screen.

Fig. 6 illustrates the Lyric Poetry lesson screen, presenting the characteristics and examples of lyric poems that express personal thoughts and emotions.

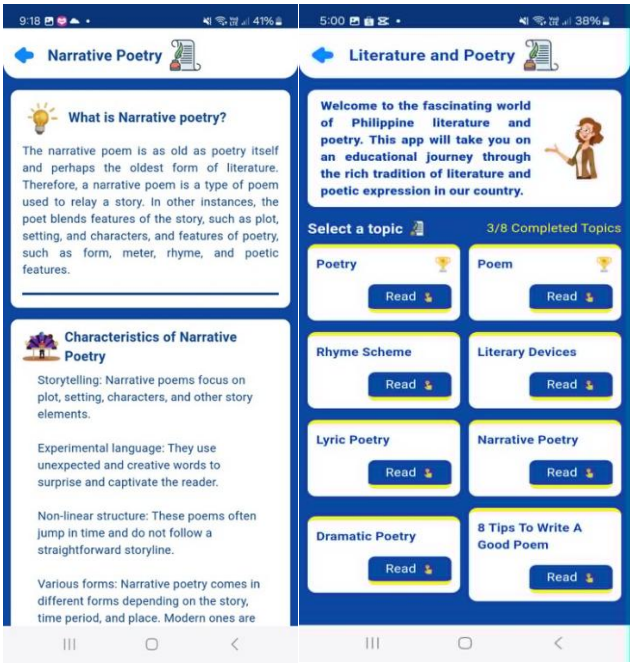

Fig. 7. The narrative poetry lesson screen.

Fig. 7 presents the Narrative Poetry lesson screen, introducing story-based poems and their narrative elements, including characters, setting, and plot.

Fig. 8. The poetry writing tips lesson screen.

Fig. 8 shows the Poetry Writing Tips lesson screen, providing guidelines and strategies for composing meaningful and creative poems.

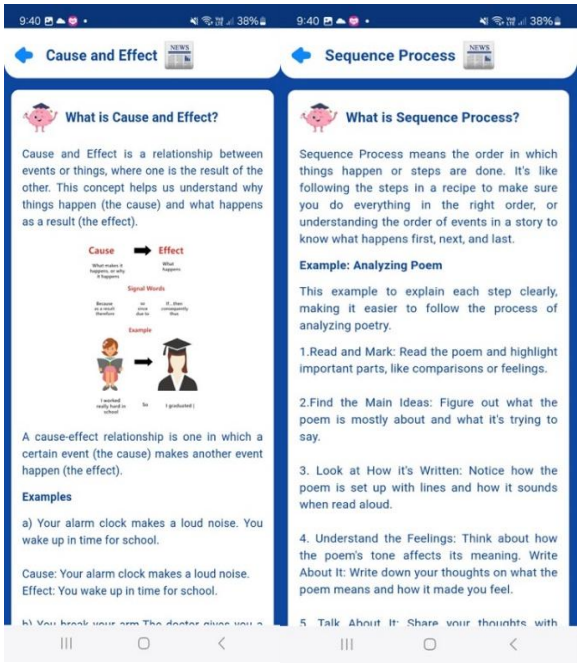

Fig. 9. The drama lessons menu.

Fig. 9 illustrates the Drama Lessons Menu, which contains the instructional modules and activities for the drama component of the Grade 7 English curriculum.

Fig. 10. The nature and history of drama lesson screen.

Fig. 10 presents the Nature and History of Drama lesson screen, introducing drama as a literary genre and explaining its characteristics and historical development.

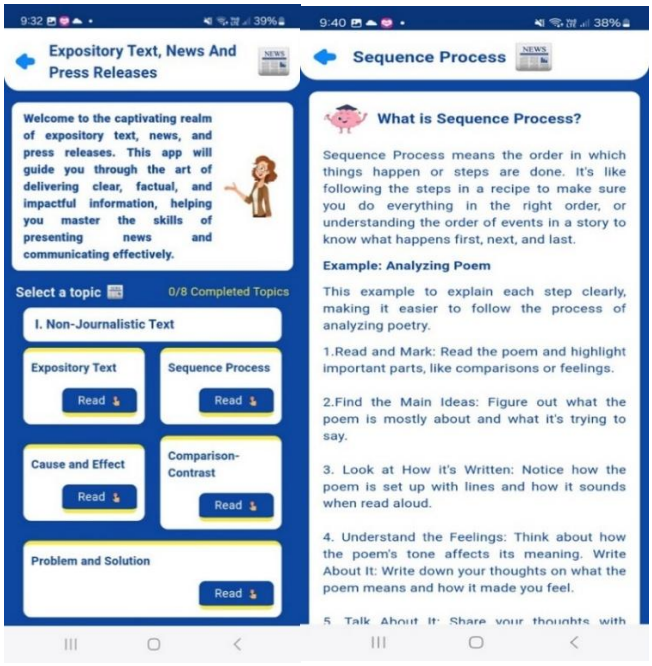

Fig. 11. The expository text lessons.

Fig. 11 shows the Expository Text lessons and activities, which develop learners' understanding of informational texts and organizational patterns.

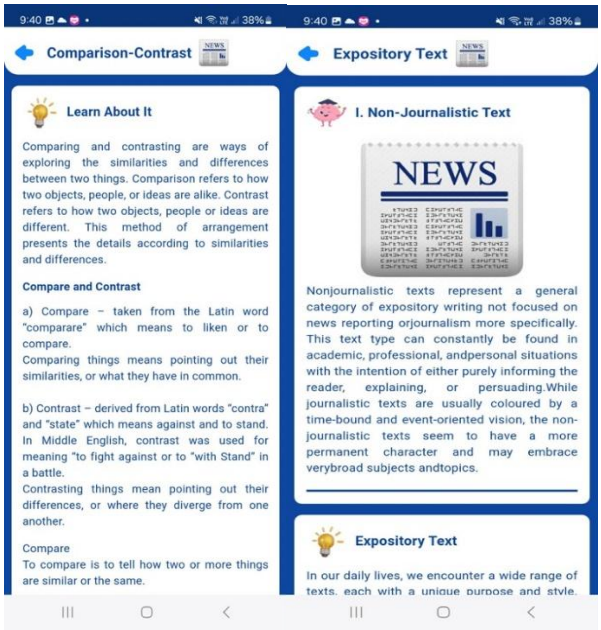

Fig. 12. The news and press releases lessons and learning activities.

Fig. 12 presents the News and Press Releases lesson screen, introducing journalistic texts and activities that enhance learners' comprehension of informational materials.

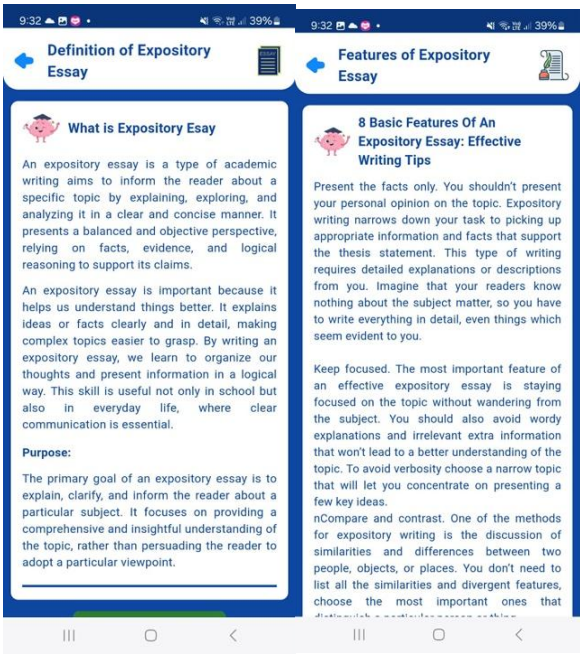

Fig. 13. The expository essay lesson.

Fig. 13 illustrates the Expository Essay lesson screen, which explains the structure and characteristics of expository writing, and Fig. 13. The Learning Activities and Assessment Dashboard.

B. Expert Validation

The completed ReadTech Mobile Reading Application was evaluated by six expert validators. Results are presented in Table V.

TABLE V. EXPERT VALIDATION RESULTS

Criterion	Mean	Interpretation
Content Quality	4.50	Highly Valid
Accuracy of Tasks	4.83	Highly Valid
Instructional Design Quality	4.67	Highly Valid
Technology and Usability	4.83	Highly Valid
Overall Mean	4.71	Highly Valid

The expert validators rated the application as highly valid across all dimensions. The highest ratings were obtained in Accuracy of Tasks and Technology and Usability. These results indicate that the learning activities, assessment components, instructional design, and technological features are appropriate for the intended users and aligned with the objectives of the application.

C. Acceptability of the ReadTech Mobile Reading Application

Following expert validation and revision, the application was evaluated by student-users. Table VI presents the acceptability results.

The overall acceptability mean of 4.47 indicates that learners found the application highly acceptable. Among the evaluated dimensions, Engagement obtained the highest rating, followed by Functionality and Usefulness. The results suggest that learners perceived the application as interactive, motivating, and beneficial for reading development.

TABLE VI. ACCEPTABILITY OF THE READTECH MOBILE

Dimension	Mean	Interpretation
Usability	4.30	Highly Acceptable
Functionality	4.48	Highly Acceptable
Engagement	4.65	Highly Acceptable
Usefulness	4.43	Highly Acceptable
Overall Mean	4.47	Highly Acceptable

D. Discussions

The identified learner needs directly informed the design of the ReadTech Mobile Reading Application. For example, the high demand for vocabulary-building activities resulted in the integration of the "Word of the Day" module, while the need for structured reading comprehension activities led to the development of curriculum-aligned reading lessons, quizzes, and progress-monitoring features. Likewise, learners' preference for gradual learning progression guided the implementation of the level-unlocking mechanism, allowing students to complete prerequisite lessons before accessing more advanced instructional content. The Design and Development Research methodology facilitated an iterative development process in which learner needs, expert recommendations, and usability considerations were continuously incorporated into the application. Such an approach is consistent with learner-centered instructional design, where educational technologies are developed based on the characteristics and requirements of their intended users rather than solely on technological considerations.

The expert validators rated the application highly across all evaluation criteria, including content quality, instructional design, task accuracy, and technology usability. These findings indicate that the instructional content is appropriate for the intended learners and aligned with the Grade 7 English MATATAG Curriculum. High ratings in task accuracy further suggest that the learning activities and assessments accurately represent the targeted learning competencies, while high usability ratings indicate that the application's interface, navigation, and overall functionality are suitable for classroom implementation. It is important to recognize that expert validation evaluates the quality of the developed educational product rather than its instructional effectiveness. High validity demonstrates that specialists consider the application educationally appropriate and technically sound; however, it does not provide evidence that learners achieve measurable improvements in reading comprehension after using the application.

Student-users also rated the application as highly acceptable across usability, functionality, engagement, and usefulness. The highest rating was obtained in engagement, indicating that learners found the application interesting and motivating to use. High usability scores further suggest that learners were able to navigate the application with minimal difficulty, while functionality and usefulness ratings indicate that the application successfully supports the intended instructional activities.

Nevertheless, learner acceptability should not be interpreted as evidence of improved academic performance. Acceptability reflects users' perceptions of the application's quality, convenience, and learning experience rather than objective improvements in reading ability. Consequently, the present findings demonstrate that learners positively received the application but do not establish causal improvements in reading comprehension or vocabulary acquisition.

The present study has several limitations. First, the evaluation focused primarily on learner needs assessment, expert validation, and student acceptability rather than instructional effectiveness. Consequently, no pretest–posttest or comparison-group design was conducted to determine whether ReadTech produces measurable improvements in learners' reading comprehension or vocabulary development. Second, the participants were drawn from two integrated schools within one municipality, which may limit the generalizability of the findings to other educational contexts. Finally, the study relied on descriptive statistical analyses because its primary objective was to evaluate the developed application rather than determine causal relationships. Future research should conduct quasi-experimental or experimental evaluations to investigate the effects of ReadTech on reading achievement, vocabulary acquisition, learner motivation, and long-term literacy development across diverse educational settings, but do not establish causal improvements in reading comprehension or vocabulary acquisition.

E. Implication of the Findings

The findings imply that Grade 7 learners require technology-supported interventions to address challenges in reading comprehension, vocabulary development, and learner engagement. The high validity and acceptability of the mobile reading application indicate that mobile-based learning can effectively supplement traditional reading instruction by promoting interactive, personalized, and self-paced learning. The results further suggest that schools and educators should integrate mobile applications into literacy programs to enhance reading outcomes and support continuous monitoring of learners' progress.

IV. Conclusion and Recommendations

A. Conclusion

This study successfully developed the ReadTech Mobile Reading Application using a Design and Development Research methodology. The application demonstrated high levels of expert validity and learner acceptability, indicating that it is a feasible and curriculum-aligned instructional resource for supporting reading instruction among Grade 7 learners. Because the present study focused on development and evaluation rather than instructional effectiveness, future research should investigate the impact of ReadTech on reading comprehension and vocabulary acquisition using experimental research designs.

B. Recommendations

Future implementations of ReadTech may involve a larger and more diverse group of learners to determine its effectiveness across different educational settings. Experimental studies may also be conducted to measure the application's impact on reading achievement and long-term retention. Additional features such as adaptive learning analytics, gamification elements, multilingual support, and teacher dashboards may be integrated to further improve learner engagement and instructional monitoring. Schools and educators are likewise encouraged to adopt and integrate mobile learning applications such as ReadTech into literacy programs to enhance reading instruction and support continuous learner development.

Acknowledgment

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