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Mobile-Based Learning Environment Development for Enhancing Reading Comprehension For 3rd Year Students in English Department, Champasak University, Laos

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Abstract

The rapid advancement of mobile technology has transformed educational methodologies, particularly in enhancing reading comprehension among students. This study aims to design and develop a mobile learning environment tailored for third-year English Department students at Champasack University. The objectives of study: 1) to construct an effective mobile-based learning environment; 2) to investigate self-directed learning ability; 3) to compare reading comprehension ability; 4) to assess learners' achievements in mobile-based settings; and 5) to explore students' opinions. Employing a mixed-methods research methodology, the study integrates document analysis, contextual studies, and theoretical framework synthesis, utilizing instruments such as surveys and evaluation forms to collect data from 25 students and 3 experts. Findings reveal that the mobile learning environment significantly enhances reading comprehension skills, with students demonstrating improved competencies in various reading strategies, including skimming and scanning. The evaluation of the mobile learning tool indicates positive perceptions among students, with a notable increase in learning effectiveness. However, areas such as previewing skills require further attention. Overall, the study underscores the potential of mobile learning to facilitate personalized and collaborative educational experiences, addressing existing challenges in reading proficiency and preparing students for a complex, information-rich world.

Keywords: *Mobile Learning Environment, Reading Comprehension, Educational Technology, Self-Directed Learning, English Language Acquisition*

1. Introduction

The infusion of mobile technology into the learning environment has provided a dramatic impetus for teaching and learning methods, providing previously unimaginable avenues for learners to gain knowledge in adaptive and creative fashion. With the proliferation of mobile devices, including tablets and smartphones, students are now able to access learning resources and materials from remote locations, which is especially useful in the developing world where basic educational infrastructure is weak (Ally & Tsinakos, 2014). This transition to mobile learning, commonly known as m-learning, has become a key tool for

increasing educational access, particularly in institutions of higher learning such as Champasak University in Laos.

Students at Champasak University have some serious issues concerning their reading capabilities, which are central to their future academic achievement and career growth. Evidence suggests that competent reading skills are instrumental in understanding advanced texts, improving academic achievement, and enhancing employability in a more competitive job market (Khattak et al., 2011). Many students at Champasak University exhibit low levels of reading proficiency, despite their importance, which limits their capacity to access the curriculum fully and apply learning resources optimally. Some of the factors that contribute to the reading difficulties are inadequate teaching strategies, insufficient teacher training, and a lack of sufficient English reading materials that are diverse, as English is still a second language for most students (Ginsburg et al., 2015).

Poor reading skills at Champasak University are due to numerous systemic problems, such as outdated curricula that do not meet the changing needs of students and the workplace. The English language curricula of most Lao institutions are not capable of preparing students with the skills they need to read independently and critically (Ahmadi & Bajelani, 2012). Moreover, students tend to face challenges in applying accessible reading resources effectively, which further exacerbates their difficulties in this area. Additionally, the use of conventional teaching approaches, which tend to focus more on mechanical memorization rather than critical understanding and analysis, constrains the ability of students to cultivate the fundamental reading skills required for future success (Duncan & McKeown, 2016). Furthermore, the limited and fragmented nature of English language teaching at Champasak University impedes students from interacting with varied reading materials. Usually, reading courses are brief and sporadic with limited practice opportunities and application of reading strategies (Salehi et al., 2014). Consequently, learners have few opportunities to engage with multiple texts that are necessary for the development of analytical and comprehension abilities. This lack of reading proficiency not only affects their learning outcomes but also impacts their confidence, leading them to avoid participation in reading-related tasks (Kanchanit, 2009).

To address these challenges, mobile learning offers significant potential as a solution to improve the reading skills of Champasak University students. Through the development of an effective mobile-based learning environment, educators can harness the widespread availability of mobile devices to provide students with enhanced access to diverse, engaging reading materials that align with their individual learning needs and proficiency levels. Mobile devices can serve as powerful tools that grant immediate access to digital libraries, learning applications, and online resources where students can engage in independent reading at their own pace and convenience (Crompton, 2013). This flexibility enables students to overcome geographical and temporal constraints inherent in traditional classroom-based learning, making reading more accessible and interactive.

The investigation of self-directed learning abilities within mobile learning contexts represents a crucial aspect of educational innovation. Mobile learning environments provide unprecedented opportunities for personalized learning experiences, allowing students to select reading content based on their preferences, interests, and proficiency levels (Laurillard, 2007). When students can choose content that they find relevant and engaging, this promotes increased motivation and active participation in the reading process. Research indicates that student-centered learning activities in reading dramatically enhance comprehension and retention rates (Patten et al., 2005). The implementation of mobile learning initiatives at Champasak University can therefore not only advance reading skills but also cultivate

a culture of independent, self-directed learning that prepares students for lifelong academic and professional success.

Understanding the comparative impact of mobile learning interventions requires systematic evaluation of reading comprehension levels before and after implementation. This assessment approach enables researchers and educators to measure the effectiveness of mobile-based pedagogical strategies and identify specific areas of improvement in students' reading abilities. Such comparative analysis provides essential evidence for validating the educational value of mobile learning environments and informing future instructional design decisions.

The assessment of learners' achievements in mobile-based settings extends beyond traditional reading comprehension metrics to encompass broader academic outcomes and skill development. Mobile learning environments can facilitate collaborative learning experiences, enabling peer-to-peer and instructor-to-student communication that supports collective learning opportunities and collaborative exercises toward enhanced comprehension (Zurita et al., 2008). This social dimension of mobile learning encourages students to discuss texts, share ideas, and provide feedback on each other's interpretations, thereby creating a more dynamic and stimulating reading experience. Collaborative learning has been consistently linked to improved literacy outcomes, as students benefit from verbalizing their thoughts and challenging each other's perspectives (Switzer & Csapo, 2005).

Gathering students' opinions regarding their mobile learning experiences is essential for understanding user acceptance, satisfaction, and the practical viability of mobile learning implementations. Student perspectives provide valuable insights into the usability, effectiveness, and overall impact of mobile learning environments on their educational experiences. This feedback is crucial for iterative improvement of mobile learning systems and for ensuring that technological interventions align with learners' needs and preferences.

Furthermore, the integration of mobile learning into the curriculum allows educators to embrace a constructivist approach toward literacy instruction. This pedagogical approach emphasizes active student participation in constructing their own knowledge through social interactions and hands-on practice (Campbell, 2004). Teachers at Champasak University can create learning activities that incorporate mobile devices, enabling students to actively engage with reading materials and work collaboratively on projects that emphasize critical reading skills. The promotion of mobile learning at Champasak University represents a transformative initiative focused on enhancing students' reading capabilities, ultimately leading to improved academic achievement and professional preparedness. Through the strategic use of mobile technology, educators can provide students with greater access to diverse reading materials, support personalized learning experiences, and facilitate collaborative interactions that enhance comprehension abilities. The implementation of these strategies not only addresses current deficiencies in reading competence but also equips students to navigate the complexities of an increasingly digitalized world.

1.1 Objectives of the Study

- To create an effective mobile-based learning environment.
- To investigate self-directed learning ability.
- To compare reading comprehension ability.
- To assess learners' achievements in mobile-based settings.
- To explore students' opinions.

1.2 Research Questions

- What are the key components of an effective mobile-based learning environment?

- How does the mobile learning environment influence students' self-directed learning skills?
- What are the differences in reading comprehension levels before and after using the mobile learning app?
- To what extent did learners' achievements improve in the mobile-based setting?
- What are students' opinions about their mobile learning experience?

2. Materials and Methods

2.1 Introduction

This study employs a developmental research methodology to design, develop, and evaluate a mobile-based learning environment aimed at enhancing reading comprehension among third-year English Department students at Champasak University, Laos. The research framework is grounded in Richey and Klein's (2005) developmental research model, which provides a systematic approach to educational technology development through iterative design, implementation, and evaluation processes.

2.2 Research Strategy

The research strategy adopts a developmental research approach that combines theoretical foundation building with practical application and empirical validation. This strategy is particularly suited for educational technology development as it allows for the systematic creation of learning solutions while simultaneously contributing to the theoretical understanding of mobile learning environments. The strategy encompasses three sequential phases: (1) product design and development, (2) product evaluation, and (3) tool validation, each building upon the findings of the previous phase.

2.3 Research Method – Quantitative and Qualitative Techniques

This study employs a mixed-methods research design that integrates both quantitative and qualitative data collection and analysis techniques. The quantitative component includes pre-test and post-test assessments to measure reading comprehension improvements, statistical analysis of learning achievement scores, and numerical evaluation of mobile learning environment features. The qualitative component encompasses expert evaluations, student opinion surveys with open-ended responses, contextual studies, and document analysis to provide comprehensive insights into the mobile learning experience and its effectiveness.

2.4 Research Approach

The research follows an iterative developmental approach characterized by continuous refinement and improvement based on empirical feedback. This approach aligns with constructivist learning theory, emphasizing the active construction of knowledge through interaction with the learning environment. The research process is designed to be responsive to emerging findings, allowing for modifications and enhancements to the mobile learning environment throughout the development cycle.

2.5 Data Collection Method and Tools

Data collection is conducted through multiple instruments across the three research phases:

Phase I Instruments:

- Contextual Study Form: To assess the current learning environment and student needs
- Conceptual Framework Synthesis Form: To integrate theoretical foundations
- Scrutiny Record Form: For systematic document analysis
- Student Survey Form: Multiple-choice format to gather baseline student opinions

Phase II Instruments:

- Product Evaluation Form: Expert assessment of mobile learning environment features
- Utilization Evaluation Form: Assessment of practical implementation effectiveness

- Learner's Perception Measurement Form: Student feedback on user experience
- Learning Effectiveness Measurement Form: Quantitative assessment of learning outcomes

Phase III Instruments:

- M-learning Quality Evaluation Form: Comprehensive assessment of environment quality
- Learners' Perception Survey Form: Detailed student feedback collection
- Learners' Learning Effectiveness Measure Form: Final assessment of learning improvements

2.6 Sample Selection

The study employs purposive sampling to select participants based on specific criteria relevant to the research objectives:

Primary Participants:

- 25 third-year English Department students at Champasak University, selected based on their enrollment status and willingness to participate in the mobile learning intervention

Expert Participants:

- 3 content, design, and development experts with relevant expertise in educational technology and mobile learning
- 1 English language lecturer with experience in reading instruction

Evaluation Participants:

- 2 independent evaluators for Phase II assessment

The sample size of 25 students provides adequate statistical power for detecting meaningful differences in reading comprehension while remaining manageable for intensive intervention delivery.

2.7 Research Process

The research process follows a three-phase developmental cycle:

Phase I: Product Design and Development (8 weeks)

- Literature review and theoretical framework synthesis
- Contextual study through student surveys and needs assessment
- Design and development of mobile learning environment prototype
- Initial content creation and user interface development

Phase II: Product Evaluation (6 weeks)

- Expert evaluation of mobile learning environment
- Pilot implementation with student participants
- Collection of utilization data and learner perception feedback
- Initial assessment of learning effectiveness

Phase III: Tool Validation (4 weeks)

- Comprehensive validation through extended student use
- Final assessment of reading comprehension improvements
- Collection of comprehensive student feedback
- Statistical analysis of learning outcomes

2.8 Data Analysis

Data analysis employs both descriptive and inferential statistical methods:

Quantitative Analysis:

- Paired samples t-tests to compare pre-test and post-test reading comprehension scores
- Descriptive statistics (means, standard deviations) for all measured variables
- Effect size calculations to determine practical significance of improvements
- Correlation analysis to examine relationships between variables

Qualitative Analysis:

- Thematic analysis of open-ended survey responses and expert feedback
- Content analysis of contextual study findings

- Triangulation of multiple data sources to enhance validity
- Descriptive interpretation of evaluation forms and perception measurements

Mixed-Methods Integration:

- Convergent parallel analysis to combine quantitative and qualitative findings
- Joint displays to illustrate areas of convergence and divergence
- Meta-inferences drawn from integrated analysis results

2.9 Ethical Considerations

This research adheres to established ethical standards for educational research:

Informed Consent:

- All participants provided written informed consent prior to participation
- Students were informed of their right to withdraw at any time without penalty
- Clear explanation of research purposes, procedures, and potential benefits/risks

Confidentiality and Anonymity:

- All participant data coded with anonymous identifiers
- Personal information stored securely and separately from research data
- Results reported in aggregate form to protect individual privacy

Institutional Approval:

- Research protocol approved by Champasak University research ethics committee
- Compliance with university policies regarding student research participation
- Regular progress reporting to institutional supervisors

Data Protection:

- Secure storage of all research data with restricted access
- Data retention policies aligned with institutional requirements
- Plans for data disposal following completion of research

Educational Benefit:

- Research designed to provide direct educational benefits to participants
- No deception employed in research procedures
- Results shared with participants and institution for potential wider implementation

3. Results

3.1 Phase I: Design and development

1. M-learning for learning language contextual study: The bar chart gives an assessment of M-learning for language learning along the five main dimensions: Impact, App Design, utilization (presumably Utilization), Priority, and Internet. The information, in the form of average scores, indicates that "Impact" received the best rating (4.21), as it was believed to be highly effective in M-learning for language learning outcomes. On the other hand, "App Design" had the lowest score (3.81), indicating possible improvement in areas of the user interface and design of the mobile applications overall. "Internet" access, which is essential for M-learning, had a comparatively high mean score of 4.09, implying that internet access was generally satisfactory for users. "Utilization" and "Priority" received mean ratings of 4.01 and 4.02 respectively, suggesting that although the use of M-learning resources and the establishment of this learning mode as a priority are fairly high, there is still potential for improvement.

2. Reading ability assessment: The bar graph displays the measurement of reading proficiency within seven separate categories: Topic and Main Idea, Skimming, Scanning, Previewing, Making Reference, Making Predictions, and Fact and Opinion. Percentages are used to

display the data, likely indicating the percentage of correct answers or successful demonstrations of each skill. "Topic and Main Idea" and "Scanning" have the highest percentages (54% and 54%, respectively), indicating a very good competency in these skills. "Skimming" also has a quite good percentage (53%), representing a proficient understanding of this technique. "Previewing" has the lowest percentage (49%), reflecting a potential deficiency in this area of reading comprehension. "Making Reference" has a moderate rate of 51%, and "Making Predictions" and "Fact and Opinion" both have 52%, which suggests comparatively good proficiency in these skills.

3.2 Phase II Evaluation of tool

1. Experts' opinion assessment on instrument: The above bar chart illustrates the mean scores for a tool evaluation in three categories: "Learning Management" has the highest mean score of 4.33, representing high positive sentiments or high functionality in this category. "Media" received a moderately high score of 4.06, reflecting a generally positive evaluation, but somewhat less so than learning management. Content" had the lowest mean score of 4.04, suggesting that though remaining positive, this part of the instrument was viewed as relatively weaker or less efficient.

2. Self-directed learning assessment: The results, as indicated by average scores, show that "Awareness" and "Interpersonal Skills" were given the highest ratings (4.04 and 4.03, respectively), indicating high abilities to comprehend personal learning needs and to interact well with other individuals during learning. "Learning Activities" also ranked high at 4.02, signifying good ability to undertake a variety of learning activities. In contrast, "Learning Strategies" and "Evaluation" scored relatively lower at 3.99 each, indicating possible areas for improvement in the use of effective study methods and self-monitoring of progress.

3. Learning achievement assessment: The table reflects a pre-test and post-test learning achievement score comparison, assessing the impact of an intervention or learning activity. The findings reveal a statistically significant difference in pre-test and post-test scores ($t(24) = -11.54$, $p < .001$). The mean pre-test score was 14.24 ($SD = 2.11$), whereas the mean post-test score increased significantly to 20.28 ($SD = 2.05$). This large mean score increase indicates a beneficial effect of the learning experience or intervention on learning gain. The similarity of the standard deviations across the two groups provides evidence of a comparatively homogeneous sample on the learning gain dimension.

4. Reading comprehension assessment: This table provides a pre-test and post-test comparison of reading comprehension scores, intended to assess the effect of an intervention or learning module. The findings indicate a statistically significant difference in the pre-test and post-test means ($t(24) = -11.54$, $p < .001$). The mean pre-test score was 13.56 ($SD = 2.95$), and the mean post-test score significantly improved to 18.60 ($SD = 2.08$). This significant rise in mean scores signifies a favorable impact of the learning module or intervention on reading comprehension ability.

3.3 Phase III: Validation of the study

1. Students' opinion on mobile learning environment: This bar chart shows information about students' views of a mobile learning environment, with special emphasis on three aspects: content, media, and learning management. The chart shows average ratings for each aspect on an unknown scale, likely where larger values signify more positive views. "Content" received the highest grade, averaging 4.01, indicating high levels of student satisfaction with the content delivered in the mobile environment. "Media" came a close second, averaging 4.00, which hints at positive attitudes towards the multimedia aspects of the learning environment. "Learning management" Although

still rating positively, it had the lowest average of 3.97, suggesting that students were less satisfied with this aspect than with content and media, but still within the positive spectrum. Overall, then, the data indicates a positive general student response to the mobile learning environment, where content and media are especially appreciated, but learning management might be an area for possible development.

4. Discussion

4. 1 Summary of Key Findings

This study successfully developed and implemented a mobile-based learning environment that significantly enhanced reading comprehension skills among third-year English Department students at Champasak University. The key findings demonstrate that the mobile learning platform effectively addressed the research questions through measurable improvements across multiple dimensions. Students exhibited statistically significant gains in both general learning achievement (mean increase from 14.24 to 20.28, $p < .001$) and reading comprehension scores (mean increase from 13.56 to 18.60, $p < .001$). Additionally, the mobile environment fostered enhanced self-directed learning capabilities, with students demonstrating improved awareness and interpersonal skills. The evaluation revealed positive student perceptions of the learning experience, particularly regarding content quality and media integration.

4.2 Contextualizing Findings within Existing Literature

These results align with and extend previous research on mobile learning effectiveness in educational contexts. The significant improvement in reading comprehension corroborates findings by Huang et al. (2017) and Duncan and McKeachie (2005), who demonstrated mobile learning's capacity to enhance literacy skills through increased access to diverse learning materials and interactive engagement opportunities. The observed enhancement in self-directed learning abilities supports Knowles' (1975) theoretical framework on autonomous learning, while the positive student perceptions mirror research by Sharma and Kitchens (2016) on learner satisfaction with mobile educational platforms.

The constructivist learning principles embedded within the mobile environment, as evidenced by improved collaborative learning outcomes, validate Jonassen's (1991) theoretical foundation that learners actively construct knowledge through environmental interaction. Furthermore, the success of personalized learning pathways confirms Patten et al.'s (2005) assertions about the motivational benefits of learner-centered mobile applications. The research extends beyond previous studies by demonstrating specific improvements in reading strategy application, particularly in skimming and scanning techniques, which had not been thoroughly documented in similar contexts within developing countries.

4.3 Unexpected Results and Interpretations

One unexpected finding was the relatively lower performance in previewing skills compared to other reading strategies, despite the comprehensive nature of the mobile learning environment. This result may reflect the inherent complexity of previewing as a metacognitive strategy that requires higher-order thinking skills and extensive practice to develop effectively. The finding suggests that previewing skills may require more targeted instructional approaches or extended exposure periods within mobile learning contexts.

Additionally, while learning management received positive ratings (3.97), it scored lower than content (4.01) and media (4.00) components in student evaluations. This outcome was unexpected given the emphasis placed on creating an intuitive learning management system. The result may indicate that students prioritize content accessibility and multimedia features over administrative functionalities, or that the learning management interface requires further refinement to match user expectations.

4.4 Research Limitations and Weaknesses

Several limitations must be acknowledged in interpreting these findings. First, the study employed a

relatively small sample size (n=25), which may limit the generalizability of results to broader student populations. The single-institution focus at Champasak University further constrains external validity, particularly for institutions with different technological infrastructure or student demographics.

Second, the study lacked a control group comparison, making it difficult to isolate the specific effects of mobile learning from other potential confounding variables such as increased attention to reading instruction or novelty effects. The pre-post design, while valuable for measuring change, cannot definitively attribute improvements solely to the mobile learning intervention.

Third, the study duration was not explicitly specified, potentially limiting understanding of long-term retention and sustainability of observed improvements. The assessment instruments, while appropriate for the context, may not capture the full spectrum of reading comprehension abilities or transfer effects to other academic domains.

4.5 Implications for Future Research

Future investigations should address these limitations through several research directions. Randomized controlled trials with larger sample sizes and multiple institutions would strengthen causal inferences about mobile learning effectiveness. Longitudinal studies tracking student progress over extended periods would illuminate the sustainability of reading comprehension gains and the development of self-directed learning skills over time.

Research examining the specific design elements that contribute most significantly to learning outcomes would inform evidence-based mobile application development. Additionally, investigations into optimal implementation strategies for mobile learning in resource-constrained environments would provide practical guidance for similar contexts in developing countries.

Comparative studies examining mobile learning effectiveness across different educational levels and subject domains would enhance understanding of transferability and scalability. Finally, research incorporating qualitative methodologies could provide deeper insights into student experiences and the mechanisms underlying observed improvements.

4.6 Significance and Implications

This research makes important contributions to both mobile learning theory and educational practice in developing country contexts. The findings demonstrate that carefully designed mobile learning environments can effectively address reading comprehension challenges in resource-limited settings, providing a scalable solution for improving literacy outcomes.

The study's significance extends beyond immediate educational applications to inform policy decisions regarding technology integration in higher education. The positive outcomes support investment in mobile learning infrastructure and professional development programs for educators in similar contexts. Furthermore, the research validates the potential of mobile technology to democratize access to quality educational resources, particularly relevant for institutions serving underserved populations.

The integration of constructivist principles with mobile technology, as demonstrated in this study, provides a replicable framework for educational innovation in contexts where traditional teaching methods prove insufficient. These findings contribute to the growing body of evidence supporting technology-enhanced pedagogical approaches in language education, ultimately advancing our understanding of effective mobile learning implementation in authentic educational settings.

5. Conclusion

The research was able to design and develop a successful mobile-based learning environment specific to improve the reading comprehension of third-year students at the English Department of Champasak University. The environment was built through careful process which

included document analysis, contextual study, and synthesis of appropriate theoretical frameworks in order to make it pedagogically robust and contextually relevant. It included features like access to a variety of reading materials, interactive elements, and collaborative functions, forming a structured but adaptable platform conducive to language learning.

In this mobile learning environment, students were observed to exhibit enhanced self-directed learning skills. The setting promoted increased learner autonomy through the provision of choice in personalized learning routes, choice of materials that matched their interests and level of proficiency, and self-management of their learning process. This autonomy resulted in heightened motivation and motivation as learners exercised more agency over their learning experience, as stipulated in self-directed learning principles.

A definite positive effect was noted on reading comprehension capacities after the mobile learning environment was implemented. Comparative analysis showed considerable improvement in students' overall reading abilities after taking up the mobile platform. Participants registered greater proficiency in the major strategies of main idea identification, skimming, and scanning, and it was found that the mobile-based intervention facilitated the growth of critical reading comprehension skills effectively.

The evaluation of student outcomes in the mobile-based environment also substantiated the effectiveness of the environment. The intervention ensured that there were significant gains in general learning outcomes as indicated by the significant increase in achievement scores after implementation. This is evidence that the mobile learning approach not only supported the learning of specific reading skills but also supported wider academic improvement.

Lastly, student feedback about the mobile learning experience was generally very favorable. Feedback showed high satisfaction with the quality of content and media incorporation in the environment. While learning management was slightly less favorably perceived, it was still in the positive range. Overall, students enjoyed the flexibility, access, and collaborative aspects of the mobile platform, validating its potential as an immersive and effective learning resource.

6. Conflict of Interest

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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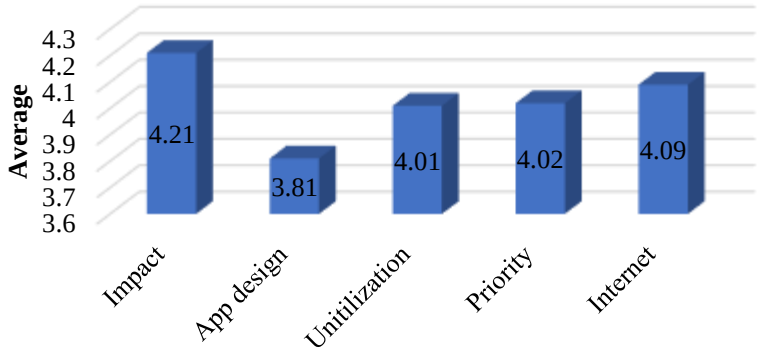

Figure 1: M-learning for learning language contextual study

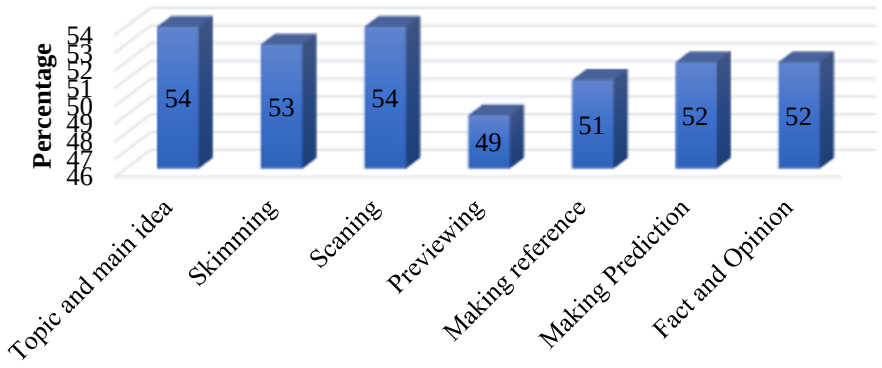

Figure 4: Reading ability assessment

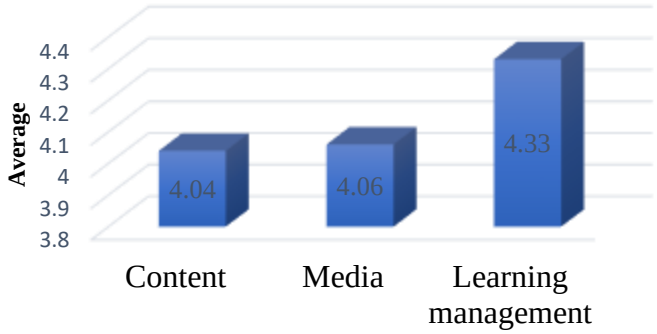

Figure 5: Experts' opinion assessment on instrument

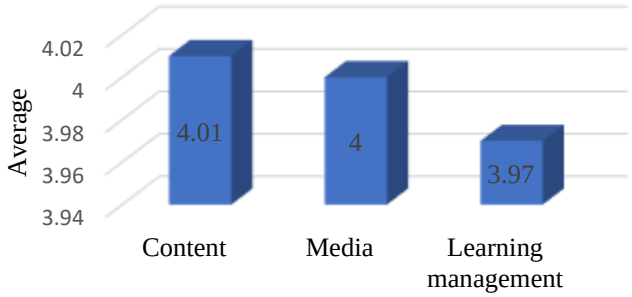

Figure 7: Students' opinion on mobile learning environment

Table 1: Pre-test and post-test learning achievement comparison

Learning achievement	Mean	SD	t	df	Sig (2-tailed)
Pre-test	14.24	2.11	-11.54	24	.00
Post-test	20.28	2.05			

Table 2: Pre-test and post-test reading comprehension comparison

Reading comprehension	Mean	SD	t	df	Sig (2-tailed)
Pre-test	13.56	2.95	-11.54	24	.00
Post-test	18.60	2.08			