

ENHANCING LOCAL LANGUAGE EDUCATION THROUGH MULTIMEDIA: A CASE STUDY ON WOLIO LANGUAGE LEARNING FOR JUNIOR HIGH SCHOOL STUDENTS

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Abstract

The purpose of this study is to improve learning in Wolio language for Junior High School students using multimedia. Specifically, it aims to improve students' reading skills in Wolio and their ability to write using Wolio letters. This study uses an application development approach to create a multimedia-based learning tool for learning the Wolio language. The development process used the analysis, design, development, implementation, and evaluation (ADDIE), allowing for the systematic design and implementation of the application. The application was integrated with the 5E learning model to develop the pedagogical relevance of learning materials which include learn by doing activities with meaningful learning experiences. The pre-test and post-test results showed a significant difference in the means for 30 respondents and an increase average from 11.71% to 50.48%. The paired t-test indicates that there is a significant difference ($t\text{-statistic} = 34.31$ and $P\text{-value} < 0.001$) before and after using the application. Overall, these results prove the multimedia-based learning tool integrated with 5E learning model is effective and feasible based on the tests that have previously been conducted. The study showcases the digital tools' potential in enhancing the teaching of the local language.

Keywords: 5E model, ADDIE, Educational technology, Local language, Wolio.

1. Introduction

The issue of conserving Local Languages has emerged as a major global challenge. Globalization is often the cause of the homogenization of language. In turn, that impacts cultural identity and leads to the extinction of traditional knowledge [1, 2]. In countries like Indonesia where multilingualism is embraced, the use of the national language in formal education has caused hundreds of indigenous languages to be displaced and become endangered [3]. A native language, known as Wolio, used to be spoken in Southeast Sulawesi. It is now in critical danger because its speakers, including the younger generation, have become fewer and fewer [4]. Therefore, it is an urgent requirement to find an alternative and systematic way of education. The multimedia of the Pedagogy of Languages (PL) or Educational Technology has urgently engaged into language teaching and language learning [5]. In order to create such effective material, a systematic instructional design framework is needed such as the ADDIE model: Analysis, Design, Development, Implementation and Evaluation [6]. Furthermore, a robust pedagogical theory model like the 5E Model: Engage, Explore, Explain, Elaborate and Evaluate, which compliances inquiry-based learning which is so essential for proficient language learning [7].

The application of technology and structured instructional models in language education has been a consistent focus of scholarly inquiry. Research has consistently demonstrated the positive impact of multimedia on student engagement and academic achievement in language learning [8, 9]. The 5E Model has been generally validated as a powerful teaching strategy that enhances conceptual understanding and thinking skills related to a number of subjects, including second language acquisition and literacy [10, 11].

Similarly, the ADDIE model serves as a foundational framework for systematically developing high-quality educational resources, including multimedia applications [12]. However, while studies abound on the use of multimedia and the 5E model for teaching global or second languages, research focusing on the development and implementation of these tools for preserving endangered local languages in Indonesia remains limited. Previous studies have highlighted the challenges of local language maintenance in the Indonesian education system [13], and some have explored the sociolinguistic aspects of the Wolio language [4], but a clear gap exists in the literature regarding the systematic design and evaluation of a multimedia-based, 5E-aligned literacy program specifically for Wolio.

Therefore, this study addresses the identified research gap by focusing on the systematic design and development of a multimedia learning application for the Wolio language. The primary purpose of this research is to design and develop a multimedia learning application based on the 5E Instructional Model for Wolio language literacy among junior high school students. The method employed in this study is Research and Development (RandD), utilizing the ADDIE instructional design model as its procedural framework. The study will not only result in a validated and culturally relevant multimedia literacy program but will also analyse its impact on student achievement in learning the Wolio language, thereby providing an empirically supported model for local language revitalization through educational technology.

2. Literature Review

Preservation of language diversity, especially in areas experiencing rapid language shift, is an important issue in the world [2]. Indonesia also faces the issue of language preservation because it consists of more than 700 local languages, which are harmed by the lack of adequate learning materials within the national learning system [5, 13-15]. This systemic gap, which contrasts with successful integration models like Ghana's National Literacy Acceleration Program, has led to a significant decline in speaker numbers for languages such as Sundanese, for instance [16-18]. Wolio language in Southeast Sulawesi also faces the same issue because the survey revealed that the junior high school students do not master the reading and writing skills, causing the language to soon go to the brink of extinction [4]. To solve the issue related to language decline in Indonesia, the approach proposed in the research integrates multimedia during the learning process.

Various theoretical backgrounds used in research are based on cognitive theory of multimedia learning (CTML), allowing for dual-channel processing (verbal and visual), both supporting the ability to process the cognitive loads in the best way for the acquisition process of complicated linguistic structures [8, 9]. Empirical evidence consistently validates the efficacy of multimedia in boosting student engagement and academic achievement, improving communication efficiency, and supporting local language learning through educational games [19-21]. Furthermore, the 5E Learning Cycle Model is a validated pedagogical strategy for advanced language acquisition, promoting active participation, inquiry, and reflective analysis [10, 11, 22-24]. The model has been shown to work in many fields such as mathematics and second language grammar instruction [7, 11, 13, 25].

Creating such an application from a technical and strategic perspective requires technology and innovation, IT and management strategy for digitalization, and its design must be successful in increasing student interest in the language subject [26]. In addition, the design should consider the need for specialized multimedia and ensure that the content is culturally contextualized based on local materials [27]. While the 5E model and multimedia have been proven effective in general and second language contexts, research in this gap is lacking. The lack of comprehensive and strategic studies that systematically integrate these components is interesting in that it is required to design and test a technology-based literacy program for local endangered languages such as Wolio in the formal Indonesian education system. This study is thereby set to fill this gap by developing a pedagogically appropriate and culturally contextual digital resource.

3. Research Methodology

This study utilized a research and development methodology using RandD design guided by ADDIE instructional design in developing a multimedia learning application of the Wolio language. The stages of the RandD process include 5 stages (i) analysis refers to the stage of problem identification, objective setting, and technical analysis; (ii) Design refers to structuring the learning flow according to the 5E model and detailing the user interface; (iii) Development refers to technical realization; (iv) production of multimedia content; (v) packaging of the application with APK format; (vi) Implementation refers to real-world implementation, which is students using the application for 20 – 30 minutes a session; and (vii) Evaluation refers to assessing effectiveness by comparing pre-

test and post-test results. The research participants were junior high school students studying at a public school located in Buton Tengah, Southeast Sulawesi, Indonesia. Participants were selected from those who were enrolled in a school that taught Wolio language in their “*Kurikulum Muatan Lokal*” (Local Content), not on the basis of their education level.

A pre-test and post-test approach was used to assess the effectiveness of the intervention in this study. The assessment instrument consisting of 35 questions spread over 4 instructional units. Specifically, unit 1 involved 5 questions, unit 2 involved 6 questions, and unit 3 involved 20 questions and unit 4 involved 4 questions. Assessments used multiple-choice questions alongside performance tasks like Wolio script reconstruction in unit 3 and S-P-O composition in unit 4. A Wolio Educational Testing Specialist reviewed the instrument for content validity. The process first set baseline through the pre-test. Afterwards followed the intervention with the multimedia application about 20-30 minutes. The post-test was last done to assess the literacy skills acquired by the students. The paired-sample t-test provides statistical evidence of the effectiveness of the multimedia application in enhancing Wolio literacy.

4. Results and Discussion

The developed multimedia application for Wolio education is structured in a systematic way with the 5E instructional model. The application’s core content is organized into four instructional units which are (i) covering Vowels, (ii) Symbols and Sounds, (iii) Basic Forms and Writing Wolio Script, and (iv) Sentence Structure (S-P-O). The official local textbook *Mari Belajar Bahasa Wolio* (1994) was used to develop the learning content. Outlines of the application functions can be seen in Table 1, and Fig. 1 shows key interface screenshots.

Table 1. Integration of the 5E model with the application feature.

5E Stage	Purpose in Wolio Language Learning	Application Feature
Engage	Activate prior knowledge	Capture attention with progress indicator tracks initial completion.
Explore	Independent investigation	Audio-based phoneme interaction which student can listen, observe, and distinguish phonetic patterns.
Explain	Formal instruction	Deliver structured explanations of linguistic concepts.
Elaborate	Apply new knowledge	Practical exercises like writing Wolio script symbols and constructing S-P-O phrases with visual support.
5E Stage	Purpose in Wolio Language Learning	Application Feature
Evaluate	Assess and feedback	Automated assessments with instant performance feedback.

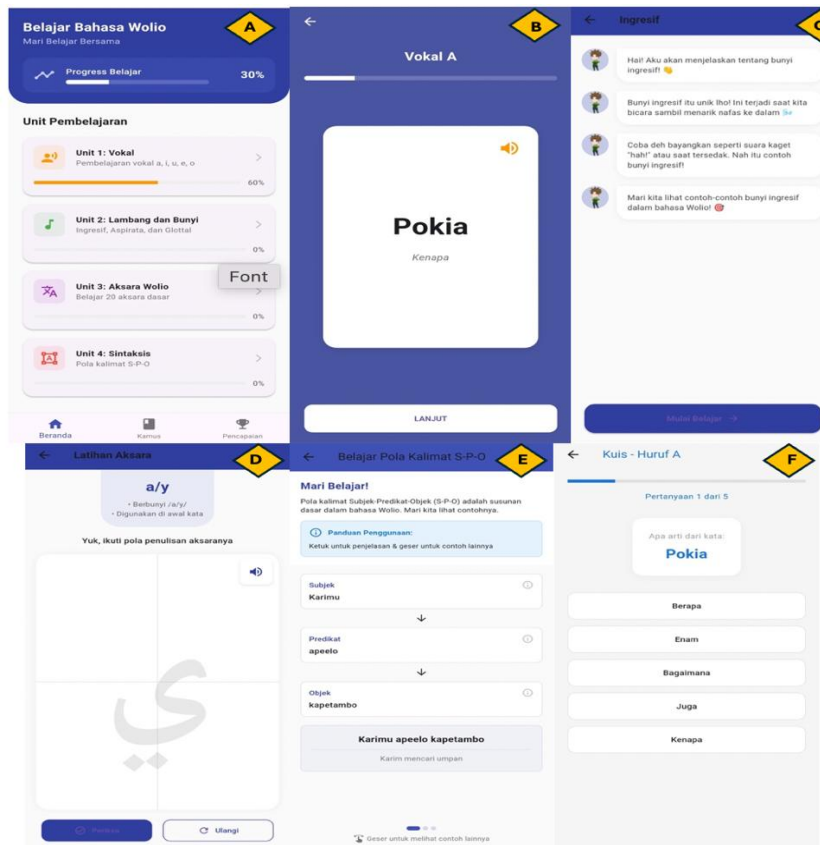


Fig. 1. Key user interfaces of the Wolio language multimedia application aligned with the 5e instructional model (a) progress learning indicator (engage); (b) vocals flashcard (explore); (c) explain ingresif sound (explain); (d) writing Wolio script learning sentence pattern learning (elaborate), (e) sentence pattern learning (elaborate); (f) vowel quiz (evaluate).

The study involved 30 students from the junior high school who had limited literacy skills in Wolio. There was a highly significant improvement in their performance measured over the four units. Analysis of individual performance, Fig. 2(a) and the box plot analysis, Fig. 2(b) also revealed the remarkable improvement.

Pre-test levels clearly indicated the low median (12.86) and the tight inter-quartile range (IQR) (8.57-17.14), but the post-test indicated a significantly higher median (51.43) and IQR (45.71-54.29). The largest improvement was the average increase of 41.67 in unit 3 (Learning the Wolio script), implying the successful utilization of the multimedia application in teaching the students the basics.

Statistical analysis by paired sample t-test was used to determine the significance of the improvement. The test clearly indicated the successful implementation of the study in improving the students' literacy in Wolio. This was indicated by the highly significant statistical value of $t = 34.31$ ($p < 0.001$), clearly

bringing out the fact that the students' literacy in Wolio was significantly improved by the application.

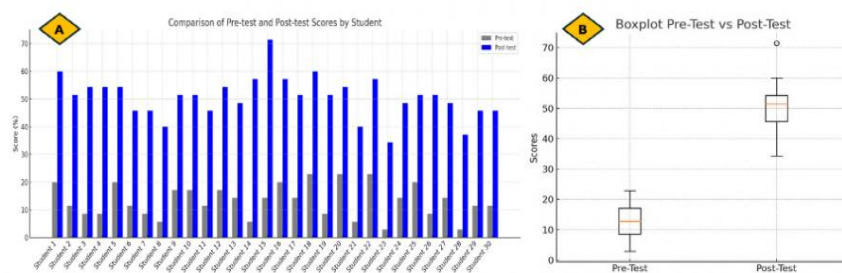


Fig. 2. Statistical comparison of student performance before and after intervention (a) bar chart comparison of pre-test and post-test scores by individual student. (b) boxplot comparison of pre-test vs. Post-test scores.

The substantial learning gains observed empirically substantiate the efficacy of the integrated theoretical and pedagogical frameworks. Essentially, the application's proven effectiveness supports the Cognitive Theory of Multimedia Learning (CTML) [9]. This theory posits that people learn better when both images and sound are presented rather than when they are presented separately. The successful result of this learning is supported by the application of the 5E Instructional Model (Engage, Explore, Explain, Elaborate, Evaluate). This finding supports earlier research which confirmed the effectiveness of the 5E model in improving learning outcomes. This model improves learning in various learning areas including Mathematics [23, 25] and Language acquisition [11].

The successful transposition of the model from its original origin in science education [22] to the local language literacy-specific context [10, 24] is evident from the results on Wolio script learning (Unit 3). Essentially, this study presents a new case study with a local focus that goes beyond diagnosing systemic policy failures [5, 13] and sociolinguistic status [1, 4, 14] to deliver a validated technology-driven response to an endangered language. The success of Wolio replanning under the ADDIE Research and Development methodology [6, 12] sets it apart from the numerous evaluations of predominant languages [20, 21]. It is thereby a valid and repeatable methodology for high-risk and low-resource languages. Additionally, the significant level of student engagement recorded during the intervention provides additional support for the motivational benefits of appropriately designed multimedia tools [19].

5. Conclusions

A multimedia application for Wolio language literacy development has been successfully designed using the ADDIE and 5E models. The intervention was significantly effective in raising student proficiency, with average scores rising from 13.14% to 50.67% ($t = 34.31$, $p < 0.001$), providing empirical evidence for the effectiveness of a structured, technology-based approach to endangered languages education. This study gives a workable model for revitalization. However, its generalization is limited due to a very small size, single locality and short-term nature. Future studies should be done on a larger scale and

longitudinally, should also apply to speaking and listening skills, and leverage advanced features like speech recognition

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