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# Using Mobile Augmented Reality to Increase Student English Language Learning

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**Abstract**

The rapid advancement of technology in the digital era has significantly impacted the digital-native generation. The objectives of this research are to create and assess a Mobile Augmented Reality application for beginner English language learning. AR can enhance learning, motivating children to explore subjects like English further. Its utilization fosters increased engagement and motivation among learners. Implementing non-monotonous methods can further motivate students to actively participate in learning. AR revolutionizes learning experiences, making them more enjoyable and beneficial. By involving students in the learning process, they become more active learners. The development of AR on mobile platforms facilitates active learning anytime, anywhere. Following Lee and Owens' R&D model, the research encompasses assessment/analysis, design, development, implementation, and evaluation. Research data, collected through Likert scale questionnaires, includes both quantitative and qualitative insights. The results offer valuable recommendations for further study.

**Keywords:** augmented reality; mobile augmented reality; generation alpha; ubiquitous learning

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## INTRODUCTION

The rapid progress and expansion of technology in the digital age have profoundly affected the generation of digital natives who have grown up alongside these advancements. The digital revolution of the past two decades is crucial as it shapes both education and technology for early childhood (Berson and Berson 2010). Consequently, effective learning for today's Alpha generation involves providing tailored learning experiences that meet their unique needs and capabilities. In the current digital era, learning is no longer a one-sided affair. Traditional learning, confined to a single source such as a teacher or a textbook without utilizing multiple open resources, is now considered outdated. The focus has shifted towards student-centered learning (SCL). According to Mcmillan (2017), educators today must prepare diverse learning strategies and methods that prioritize SCL. Learning can now take place anytime, anywhere, and on any device, thanks to network and ubiquitous technologies, as emphasized by Ulfa (2014). This evolution towards 21st-century learning underscores SCL, where students prefer to learn both formally and informally in flexible environments. Ubiquitous learning, an advancement from e-learning and mobile learning, adapts educational approaches to meet the individual learning styles of students, accessible across

various contexts and devices (Kadek Suartama et al. 2020; Pishtari et al. 2020). In line with the previous study by Darwin & Chaeruman (2022), nearly all students perceive an enhanced level of interaction among themselves and with teachers due to the e-Learning model. Furthermore, Istiyowati et al. (2021) highlight ubiquitous learning as particularly suitable for Generation Alpha, facilitating a seamless transition between formal and informal learning and bridging physical and virtual learning spaces.

Monotonous learning refers to traditional, teacher-centered approaches where education primarily consists of lectures and one-way communication. In contrast, 21st century education presents significant opportunities through technologies like Augmented Reality (AR), which revolutionize learning from conventional to contemporary methods (Kalana et al., 2020). According to Santos et al. (2016), AR enhances student engagement by improving memory retention and increasing learner satisfaction. The integration of AR in education has grown considerably, supported by numerous studies demonstrating its potential to enhance the effectiveness and appeal of learning (Chen and Tsai 2012; Kamarainen et al. 2013).

Augmented Reality (AR) in education categorized as ubiquitous learning, which offering significant benefits especially in English lessons by enhancing motivation and encouraging deeper exploration of learning materials. According to Yuen et al. (2011), AR usage typically boosts motivation and engagement among learners. The advancement of AR, coupled with ubiquitous learning principles, supports personalized learning experiences tailored to individual educational needs. Mobile Augmented Reality has emerged as a platform for educational use, facilitated by increasingly powerful mobile devices, as noted by Huang et al. (2013). Laine (2018) highlights that mobile AR enables interaction with virtual content such as 3D models and videos, integrating seamlessly with real-world environments. This flexibility makes mobile AR suitable for both formal and informal learning contexts, aligning with educational research emphasizing the benefits of gamification and interactive learning (Nincarean et al. 2013; Videnovik et al. 2020). The evolution of AR in education not only enhances learning quality but also makes the learning process more engaging and enjoyable (Pedaste et al. 2020). By fostering active participation among students, mobile AR supports learning anytime and anywhere, across various devices (Laine 2018). Its application in informal educational settings, such as virtual tours resembling museum visits, further enriches the learning experience.

According to the EF English Proficiency Index 2023, Indonesia ranks 13th out of 23 Asian countries in English proficiency, placing it in the lower category despite being in the middle range. There has been minimal progress in English learning methods during the digital era, which still predominantly rely on monologue-style teaching where students focus on single textbooks. In English language education, a common method involves descriptive learning, where students memorize and understand objects based on provided descriptions. This approach often hinders comprehensive understanding, particularly in descriptive learning where students rely solely on imagination rather than grasping material deeply. In English language learning, simply visual aids in textbooks often fail to facilitate thorough comprehension or effective vocabulary memorization. Practice questions with audio are typically limited to classroom sessions, denying students

the opportunity to review materials afterward. Furthermore, the lack of kinesthetic learning methods results from students' passive engagement, merely copying answers without interactive involvement. In the theory of English learning for elementary school students, there is a focus on delivering educational materials in engaging and diverse ways, utilizing digital technology, games, and activities that align with students' interests and needs. According to Rofi'i et al. (2023), the application of digital technology in mobile-based English learning for elementary schools offers several significant advantages. These include: 1) enabling students to independently learn English using mobile devices, 2) presenting interactive materials to enhance the enjoyment of the learning process, and 3) providing feedback to help students identify errors and improve their English comprehension more effectively.

In addressing these challenges, the use of Augmented Reality (AR) presents a promising solution for enhancing vocabulary mastery and comprehension in English education. Integrating Augmented Reality (AR) into lessons can significantly enhance vocabulary acquisition and language mastery. According to Saffar et al. (2016), AR not only improves language learning effectiveness but also boosts student engagement and satisfaction. Additionally, Gay (2022) highlights that technology, including AR, effectively motivates students to learn English as a Foreign Language (EFL) vocabulary. Researchers have developed a Mobile AR application tailored for beginner-level English learners, focusing on vocabulary acquisition, pronunciation, and listening skills. Unlike traditional methods, this AR application immerses students in interactive contexts where they can see and hear vocabulary in meaningful situations, encouraging personal connections and deeper understanding. This study aims to explore the efficacy of Mobile Augmented Reality in transforming English language education for beginners.

## METHODS

This study employs the research and development (R&D) methodology, focusing on the creation of an Augmented Reality-based multimedia learning tool for mobile devices. Following the development model of Lee and Owens (2004), the researcher conducted a trial phase to assess the validity and effectiveness of the product.

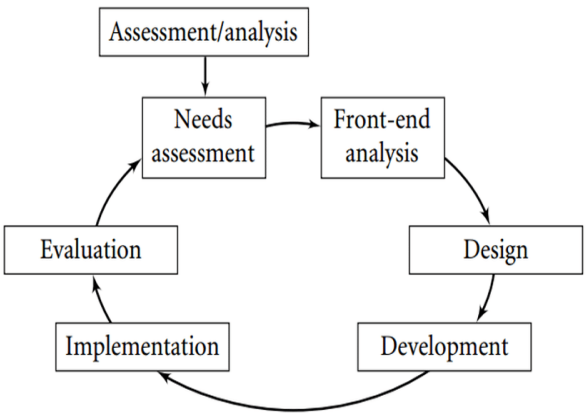


**Figure 1.** Lee and Owens (2004) Models

The initial stage comprises two main parts; 1) needs assessment and 2) front-end analysis. During the needs assessment, researchers visited elementary schools to conduct field observations aimed at identifying gaps between current and desired educational conditions. Specifically, observations focused on 6th grade students to assess their classroom facilities and the media utilized in their learning experiences. It was found that interactive media usage in teaching is currently limited, resulting in less engaging and interactive classroom environments. This lack of interactivity can diminish student enthusiasm, interest, comprehension, and overall learning outcomes. The development of the Mobile Augmented Reality application aims to address these issues by enhancing student engagement, interest, comprehension, and learning outcomes, as well as fostering increased interaction between teachers and students. In the front-end analysis, several analytical activities were undertaken, including; 1) audience analysis; 2) technology analysis; 3) situation analysis; 4) task analysis; 5) objective analysis and; 6) media analysis.

During the design phase, the researcher developed educational media intended for the Mobile Augmented Reality application. This involved designing materials provided to students, incorporating elements such as visual images (3D), audio components, and various practice exercises. Throughout this stage, the researcher sought feedback on the media design from both content experts and media specialists. During the development phase, researchers implemented the validated design, which was deemed feasible by both content experts and media specialists. The development process focused on assembling and organizing materials relevant to English language learning. During the implementation phase, the researcher conducted testing of the Mobile Augmented Reality application with elementary school students. The researcher provided clear instructions through manuals in both the book and the application. Once students comprehended the instructions, they proceeded to engage with the provided learning materials and exercises. To enhance the quality of the developed product, researchers conducted an evaluation by distributing questionnaires to pertinent experts and students. The feedback gathered served as the foundation for refining both the applications and accompanying materials. This evaluation process is crucial for delivering improved products that align with user needs and expectations.

The trial involved 6th grade elementary school students and utilized quantitative data gathered through expert and student validation questionnaires. The research instrument used was a questionnaire, as described by Kabir (2016), which is effective for measuring various aspects such as behaviour, preferences, and factual information. Similarly, Taherdoost (2016) emphasizes that questionnaires are instrumental in obtaining specific and meaningful answers to research inquiries. Thus, the questionnaire in this study was designed to evaluate the functionality, technological sophistication, and user-friendliness of the Mobile Augmented Reality application which has been developed.

**Table 1.** Percentage Description

| Percentage | Description |
|---|---|
| 80% - 100% | Very feasible |
| 60% - 79% | Feasible |
| 40% - 59% | Neutral |

| Percentage | Description |
|---|---|
| 20% - 39% | Not feasible |
| 0% - 19% | Very unfeasible |

The questionnaires use to evaluate the effectiveness and practicality of educational materials, represented as a percentage. The data analysis will yield a percentage score using a standard formula using Likert Scale. The percentages are categorized into five levels: highly feasible and strongly agreed upon (80% - 100%), feasible and agreed upon (60% - 79%), moderately feasible, neutral, and somewhat agreed upon (40% - 59%), not feasible and disagreed upon (20% - 39%), and highly unfit and strongly disagreed upon (0% - 19%).

## RESULTS & DISCUSSION

In the augmented reality mobile application created by researchers, QR codes are utilized to facilitate the learning process about animals. The learning content is divided into three sessions: 1) carnivores, 2) avians, and 3) herbivores. The application includes descriptive text and audio features designed to assist students in their learning journey about the animal kingdom. As shown below which is the result of the development of augmented reality mobile applications.

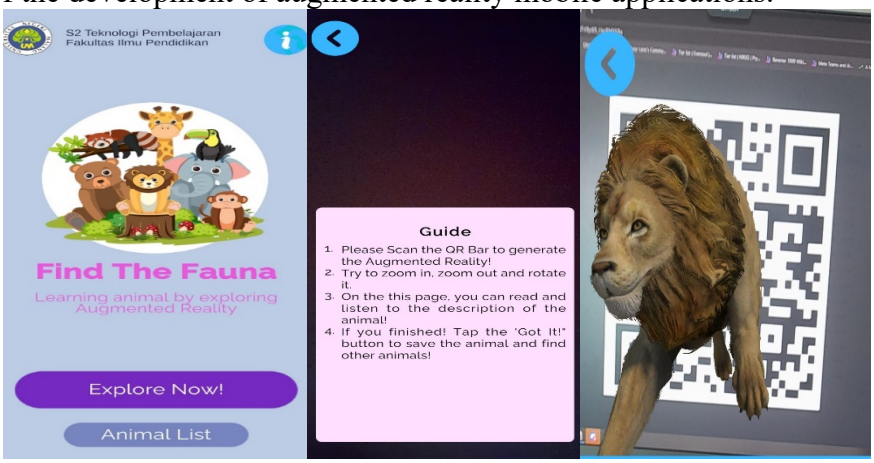


**Figure 2.** Example of Application Display

Before implementing it in learning, researchers will conduct validation to media and content validators. There are several aspects that will be assessed by the validator to assess the feasibility of the application that has been developed. The following are the results of the validators' assessment.

**Table 2.** Media Expert Test Expert

| Aspect | Percentage | Description |
|---|---|---|
| Physical Features of Cover Design | 100% | Very feasible |
| Learning Objectives Formulation | 80% | Very feasible |
| Instructions for use | 80% | Very feasible |
| Sentence or Language Content Statement | 100% | Very feasible |
| Content and Materials | 100% | Very feasible |
| Evaluation Tools | 80% | Very feasible |

Based on the calculated validation percentages, the media used in the developed augmented reality mobile application achieved a validation rate of the criteria for high suitability and effectiveness in learning activities.

**Table 3.** Materials Expert Test Results

| Aspect | Percentage | |
|---|---|---|
| Physical Features of Cover Design | 100% | Very feasible |
| Learning Objectives Formulation | 80% | Very feasible |
| Instructions for use | 80% | Very feasible |
| Sentence or Language Content Statement | 100% | Very feasible |
| Content and Materials | 100% | Very feasible |
| Evaluation Tools | 80% | Very feasible |

Consequently, further validation will proceed to the final product trial. Similarly, the material utilized in the application attained a strong feasibility and appropriateness for educational purposes, warranting continuation to the final product trial.

**Table 4.** Individual learning test results

| Aspect | Percentage | |
|---|---|---|
| Physical Features of Cover Design | 90% | Very feasible |
| Learning Objectives Formulation | 86% | Very feasible |
| Instructions for use | 80% | Very feasible |
| Sentence or Language Content Statement | 86% | Very feasible |
| Content and Materials | 100% | Very feasible |
| Evaluation Tools | 90% | Very feasible |

In the study involving sixth-grade elementary school students, the findings were generally positive. Students were able to access and operate the application with ease. However, they encountered some challenges, including limited flexibility in the movement of 3D images and unclear audio quality. Nevertheless, the individual trial results confirming the material's high feasibility and suitability for learning activities.

The developed Mobile Augmented Reality (AR) learning implementation aligns with previous studies and effectively integrates AR technology into a mobile platform for education. This approach has significantly transformed the learning process from traditional monologue styles to interactive and engaging experiences. The absence of student engagement and reliance on traditional teaching approaches contribute to reduced student participation and involvement in learning (Dian Rosdiana Noor et al., 2022). Emphasizing ubiquitous learning principles, the application ensures accessibility anytime and anywhere. The AR-based learning method enhances vocabulary comprehension by delivering information through visual, auditory, and kinaesthetic modalities, thereby improving material absorption. Additionally, exercises like writing new vocabulary in provided spaces further enhance students' grasp and mastery of vocabulary. By leveraging visual learning supported by AR technology, students can swiftly grasp and retain educational content. The application facilitates direct identification and

understanding of new vocabulary, enhancing clarity through visual and descriptive features, particularly in contexts such as animal characteristics and shapes.

## CONCLUSION

Based on the findings from the developmental research conducted by the researchers, it can be inferred that the mobile augmented reality application developed is suitable for use as a learning tool for 6th grade elementary school students. The validation tests conducted through expert reviews indicate that the application meets high standards of effectiveness and suitability for learning activities. For future studies, researchers suggest expanding the content offered, enhancing the flexibility of 3D elements, and optimizing compatibility across various devices.

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