AUGMENTED REALITY (AR) APPLICATION FOR MULTIMODAL ENGLISH TEXT LEARNING: ENHANCING ENGAGEMENT AND COMPREHENSION

IRSYAD NUGRAHA*, EMI EMILIA, WAWAN GUNAWAN

Universitas Pendidikan Indonesia, Bandung, Indonesia
*Corresponding Author: irsyad080383@upi.edu

Abstract

This study developed an augmented reality (AR) application for multimodal English text learning to enhance student engagement and comprehension through multisensory experiences. Using Luther-Sutopo's Multimedia Development Method, the research followed six stages: conceptualization, design, material collection, assembly, testing, and distribution. The AR application integrated text, 3D models, and audio narration aligned with multimodality theory. A trial with 35 high school students demonstrated that the application improved motivation and participation because it combined visual, auditory, and kinesthetic elements. The AR platform successfully created interactive learning environments that supported diverse learning styles and increased students' comprehension. The findings suggest AR-based multimodal tools hold significant potential for modern English education.

Keywords: Augmented reality, Educational technology, English language teaching, Interactive media, Multimodality.

1. Introduction

The integration of AR in teaching addresses the limitations of traditional text-based methods, which often fail to engage diverse learning styles [1, 2]. AR transforms static materials into immersive, multisensory experiences, enhancing comprehension and retention by combining visual, auditory, and kinesthetic modes [3, 4].

Many reports regarding AR have been well-documented [5-13]. Table 1 shows several examples of the use of AR for English language teaching and learning. Previous research highlights AR's effectiveness in fostering multimodal learning, improving critical thinking, and facilitating collaboration [9, 10].

However, most AR implementations focus on general educational contexts, with limited applications tailored for English language multimodal texts that combine linguistic analysis, 3D models, and audio narration.

This study develops an AR application designed specifically for multimodal English text learning. It integrates genre-based descriptive texts, local themes, and interactive elements to enhance language acquisition.

The novelty lies in (i) using school-themed objects linked to 3D models and audio, (ii) applying genre-based descriptive texts within AR environments, and (iii) offering simultaneous text-visual-audio interactions that adapt to varied learning preferences.

Table 1. Previous research on AR application for multimodal English text.

No.	Title	Ref.
1	Enhancing multi-modal perception and interaction: An augmented reality visualization system for complex decision making.	[7]
2	Effect of visual auditory and kinesthetic learning on students' reading skills in English language.	[8]
3	Virtual and augmented reality effects on K-12, higher and tertiary education students' twenty-first century skills.	[9]
4	Teaching multimodal literacies with digital technologies and augmented reality: a cluster analysis of Australian teachers' TPACK.	[10]
5	Context aware ubiquitous learning environments for peer-to-peer collaborative learning.	[11]
6	Mobile augmented reality and language-related episodes.	[12]
7	Scaffolding augmented reality model to enhance deep reading skill.	[13]
8	A review of multimodal interaction technique in augmented reality environment.	[14]
9	The application of augmented reality in learning English phonetics.	[15]
10	A digital text as the means of integrating informational technologies into teaching English.	[16]
11	International English learners' perspectives on multimodal composing and identity representation via multimodal texts.	[17]
12	Read, watch, listen, and summarize: Multi-modal summarization for asynchronous text, image, audio, and video.	[18]
13	Multimodal translation system using texture-mapped lip-sync images for video mail and automatic dubbing applications.	[19]

2. Literature Review

AR integrates digital overlays, such as 3D models and audio, into physical environments, enhancing interactivity in education [1, 20, 21]. In English language teaching, AR supports multimodal learning by combining visual, auditory, and kinesthetic elements, improving comprehension and engagement [3, 4].

Figure 1 illustrates the AR system workflow, involving five key components: user, device, marker, software, and AR object [22, 23]. This structure enables dynamic interactions between students and multimodal texts. Prior research confirms AR's role in facilitating deeper learning, enhancing motivation, and supporting diverse learning styles, reinforcing its potential for English education [9, 10].
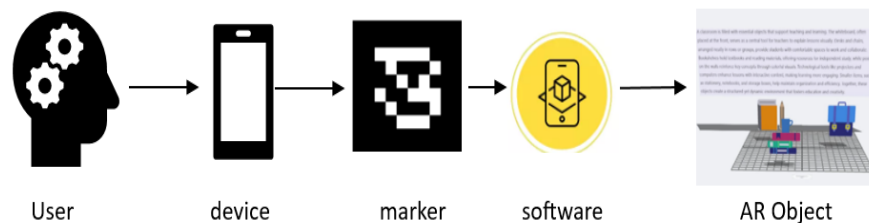

Fig. 1. Augmented reality technology concept.

3. Method

This study employed Luther-Sutopo's multimedia development method, a systematic six-stage framework: conceptualization, design planning, material collection, assembly, testing, and distribution. Detailed information for this method is explained elsewhere [24]. This method ensured structured development of the AR application for multimodal English texts, integrating text, 3D animations, and audio. After designing and assembling the AR platform, functionality testing was conducted using mobile devices to verify marker recognition, content responsiveness, and cross-device compatibility. The application was then implemented in English classes with 35 high school students to evaluate usability and learning impact. Feedback from students and teachers assessed the effectiveness of the AR platform in enhancing engagement, comprehension, and multimodal interaction during English language learning.

4. Results and Discussion

Figure 2 illustrates the flowchart of the AR application process. It begins with scanning predefined markers using a mobile device. If detected, the system overlays 3D animations and audio on the physical material; if not, it prompts the user to retry scanning.

Figure 3 presents the AR application interface. It includes a classroom-themed dashboard (Fig. 3(a)), an AR guide (Fig. 3(b)), interactive modes (Fig. 3(c)), and object-specific activations (d-h), such as books and stationery. These elements integrate text, audio, and 3D visuals to support multimodal learning.

The testing phase confirmed the application's functionality across various devices, with optimal marker recognition at 5-45 cm under normal lighting. During trials with 35 high school students, the AR platform enhanced engagement, comprehension, and participation due to its multimodal integration, aligning with prior studies that highlight AR's effectiveness in supporting diverse learning styles [7, 8]. Finally, this study adds new information for language teaching and learning [25-30], especially English language [31-40].
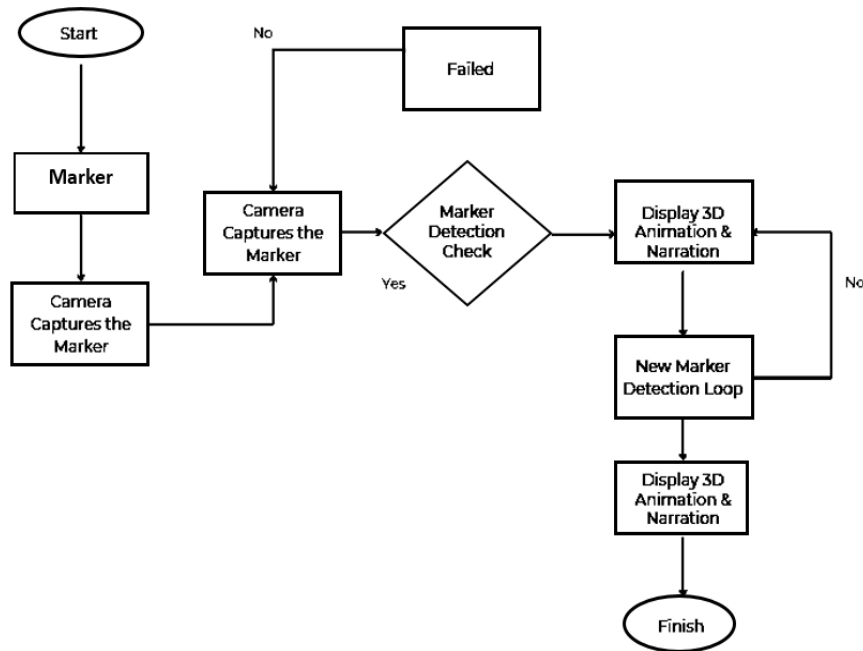

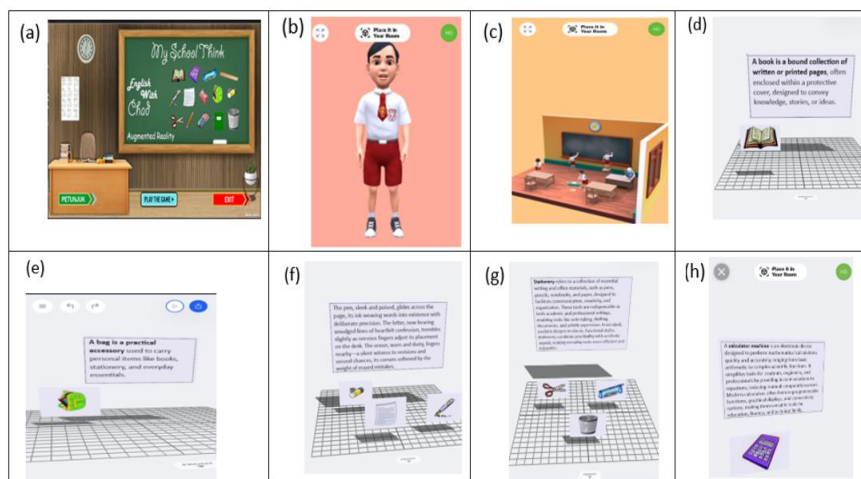**Fig. 2. Flowchart augmented reality multimodal English text.**

Fig. 3. Augmented reality application of multimodal English text.

5.Conclusions

This study developed an AR application for multimodal English learning text using Luther-Sutopo's method, proving its effectiveness through trials with 35 students. The app's 3D visuals, audio, and interactive text enhanced engagement and comprehension by supporting diverse learning styles, and multimodality theory. Results showed higher motivation and participation versus traditional methods, confirming AR's potential for modern language education. Future work could assess long-term impacts and expandability.

Acknowledgments

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