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Systematic Literature Review: 21st-Century English Learning Media Utilizing Augmented Reality

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Abstract

This study aims to analyze the current of research on AR in English language education, focusing on its ability to enhance language proficiency, retention, and fluency, while also fostering key 21st-century skills. By examining the benefits, challenges, and gaps in the literature, this review provides valuable insights for educators, researchers, and policymakers interested in incorporating AR into language education to improve learning outcomes. This study used a systematic literature review (SLR) methodology. In data sources and search strategy, relevant literature was retrieved from reputable academic databases, including: Scopus, Web of science, ERIC, and Google scholar. The search terms used included combinations of keywords such as "augmented reality," "21st-century learning media," "English language education," "AR in education," and "technology in language teaching." Boolean operators (AND, OR) were employed to refine searches. The search was limited to peer-reviewed journal articles, conference proceedings, and book chapters published between 2013 and 2024. The result showed that key benefits of AR, including enhanced student engagement, increased motivation, improved language retention, and the development of critical 21st-century skills such as creativity, collaboration, communication, and critical thinking. The implications of these findings for future research and practice in English language education are multifaceted: 1) Curriculum Design and Instructional Practices; 2) Professional Development and Teacher Training; 3) Technological Infrastructure and Accessibility; 4) Further Research on Long-Term Outcomes; and 5) Cultural and Linguistic Considerations

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Introduction

In recent years, the rapid advancement of technology has brought transformative changes to education, particularly in the field of language learning. One of the most promising innovations is Augmented Reality (AR), a technology that superimposes digital content, such as images, sounds, and interactive elements, onto the real world [1]. This immersive experience has the potential to redefine traditional classroom environments by creating dynamic, interactive, and context-rich learning experiences [2]. By its ability to engage students through interactive and visually stimulating content, AR has emerged as a powerful tool for enhancing

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the effectiveness of 21st-century learning in various educational domains, including English language education.

As educators aim to cultivate skills required for the 21st century, such as critical thinking, creativity, collaboration, and communication, AR presents an opportunity to design learning media that are not only innovative but also highly engaging [3]. It is particularly relevant for language learning, as the acquisition of a second language requires exposure to authentic contexts, interactive practices, and experiential learning, all of which AR can offer. By immersing students in virtual environments that simulate real-world scenarios, AR allows them to practice language skills in more engaging and contextually relevant ways, beyond traditional textbooks or passive learning techniques [4].

Despite the growing interest in AR potential, its integration into English language education is still relatively new, and its effectiveness remains a subject of ongoing research. Many studies have explored AR's impact on student engagement, motivation, and language learning outcomes, but there is still a need for comprehensive reviews that synthesize the existing literature on AR in the context of language education, especially in terms of 21st-century learning skills [5]. A systematic literature review can help provide a clearer understanding of how AR is being utilized in English language education, identify its benefits and challenges, and highlight areas for future research and development.

The Purpose of this study is to examines systematically the existing literature on the use of AR in English language education, with a focus on its alignment with the 21st-century learning framework. Specifically, this review seeks to explore the effectiveness of AR in enhancing key language learning outcomes, such as language proficiency, language retention, and fluency, while also considering its role in developing critical 21st-century skills. By synthesizing current research, the review will provide valuable insights for educators, researchers, and policymakers interested in leveraging AR to transform English language learning environments.

Research Methods

This study employs a systematic literature review (SLR) methodology to explore the application of augmented reality (AR) as a 21st-century learning medium in English language education. The SLR approach ensures a structured and comprehensive synthesis of existing research, following guidelines established by [6]. In data sources and search strategy, relevant literature was retrieved from reputable academic databases, including: Scopus, Web of science, ERIC, and Google scholar. The search terms used included combinations of keywords such as "augmented reality," "21st-century learning media," "English language education," "AR in education," and "technology in language teaching." Boolean operators (AND, OR) were employed to refine searches. The search was limited to peer-reviewed journal articles, conference proceedings, and book chapters published between 2013 and 2024. To ensure relevance and quality, the following criteria were applied:

A. Inclusion criteria:

1. Studies focusing on the use of AR in English language teaching and learning.
2. Publications in English.

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3. Empirical studies, case studies, or reviews that provide insights into the effectiveness, challenges, or theoretical underpinnings of AR as a learning medium.

B. Exclusion criteria:

1. Studies unrelated to education or AR.
2. Articles lacking empirical data or theoretical discussion.
3. Publications in non-academic sources.

A data extraction form was used to collect key information from each selected study, including: 1) Title, author(s), and publication year; 2) Research objectives and questions; 3) Methodology and participant demographics; 4) Findings related to AR's application, benefits, and limitations in English language education. The extracted data were synthesized through thematic analysis to identify recurring patterns, themes, and research gaps. Each study was critically appraised using a quality assessment checklist, considering factors such as research design, clarity of objectives, validity of findings, and contributions to the field. Studies with low methodological quality were excluded from the final synthesis. The findings were reported according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework [7], including a flow diagram detailing the study selection process and a narrative synthesis of the results.

Results and Discussion

A. Result

The systematic review identified 23 studies that met the inclusion criteria, published between 2013 and 2024. The findings are categorized into six key themes:

Table 1. Themes and Findings

Themes	Findings	Supporting Studies
Impact on Engagement and Motivation	1. AR increases student engagement through immersive experiences. 2. Reduces anxiety in language learning tasks.	[8]–[10]
Improved Learning Outcomes	1. Enhances vocabulary acquisition, pronunciation, and comprehension. 2. Visualizes abstract concepts, aiding deeper understanding.	[11]–[13]
Contextualized Learning	1. Facilitates communicative competence through real-world scenarios. 2. Role-playing in AR improves conversational skills.	[14]–[18]
Pedagogical Strategies	1. Effective integration includes gamification, storytelling, and collaborative AR tasks. 2. Promotes teamwork and communication skills.	[19]–[22]

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Integration Challenges	1. Barriers include high costs, need for teacher training, and technical issues. 2. Lack of AR-specific pedagogical frameworks limits adoption.	[23]–[26]
Research Gaps	1. Limited focus on long-term impacts, advanced learners, and cross-cultural applications. 2. Accessibility for diverse learners remains underexplored.	[27]–[31]

This table summarizes the key findings of the systematic literature review, highlighting recurring themes, specific insights, and gaps in the current body of research on AR as a 21st-century learning medium in English language education. The analysis reveals that AR offers significant potential in enhancing language learning experiences by fostering interactive, immersive, and student-centered learning environments. Recurring themes include increased learner engagement, improved vocabulary acquisition, and enhanced motivation to learn English.

Specific insights indicate that AR tools can facilitate contextualized language learning, allowing students to interact with virtual objects and real-world scenarios in meaningful ways. Additionally, studies show that AR applications often align with principles of multimedia learning theory, supporting dual coding and reducing cognitive overload when properly designed.

B. Discussion

1. Impact on Engagement and Motivation

AR immersive and interactive features enhance student motivation and reduce language learning anxiety [32]. By providing engaging activities, such as AR-based games or virtual environments, students remain actively involved in learning tasks. This aligns with 21st-century learning goals that emphasize creating engaging and enjoyable educational experiences [33]. AR stands out as an innovative educational tool due to its ability to create immersive and interactive experiences that enhance student motivation and reduce anxiety, particularly in language learning contexts [34]. These features are crucial in addressing some of the traditional barriers to effective language education, such as learner disengagement and communication apprehension. By making learning both engaging and interactive, AR fosters a positive emotional connection to language learning, which is critical for sustained motivation and success [21]. This alignment with 21st-century goals ensures that AR not only addresses immediate educational challenges but also prepares students for future demands in a globalized world.

2. Improved Learning Outcomes

AR positively influences core language skills, including vocabulary acquisition, pronunciation, and reading comprehension [4], [9]. Through its ability to present complex concepts in visual and

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interactive formats, AR facilitates deeper understanding and retention. This suggests that AR is particularly effective in addressing language learning challenges related to abstract concepts. AR significantly enhances core language skills, vocabulary acquisition, pronunciation, and reading comprehension, by leveraging its visual and interactive capabilities [10]. It makes AR a particularly effective tool for addressing challenges in language learning, especially when dealing with abstract or complex concepts that are traditionally difficult to teach. AR's integration into language learning enhances critical skills by offering immersive, context-rich, and interactive experiences [35]. Its ability to visualize and contextualize complex concepts makes it particularly effective for addressing traditional language learning challenges, ultimately improving both learning outcomes and learner confidence.

3. **Contextualized Learning**

AR allows learners to practice language in real-world, context-rich scenarios. For example, role-playing through AR environments helps students develop conversational skills in simulated, authentic settings [13]. This approach aligns with communicative language teaching (CLT), emphasizing the practical use of language in meaningful contexts. AR offers unique opportunities for learners to practice language skills in immersive, real-world scenarios, making language learning more practical and contextually meaningful [36]. This aligns closely with the principles of CLT, which prioritizes using language in authentic, functional settings to enhance communication proficiency. AR enhances the effectiveness of CLT by immersing learners in context-rich, interactive scenarios that foster practical language use [37]. This approach not only improves conversational skills but also equips learners with the confidence and competence needed for real-world communication.

4. **Pedagogical Strategies**

Effective integration of AR involves creative teaching methods such as gamification, storytelling, and collaborative tasks [38]. These strategies enhance not only individual learning but also teamwork and communication skills. Collaborative AR activities, in particular, reflect the social constructivist approach, were learners co-construct knowledge through interaction [37]. Effective integration of AR into language learning requires innovative teaching methods that leverage the technology’s interactive and immersive features. Approaches such as gamification, storytelling, and collaborative tasks not only enrich individual learning experiences but also foster teamwork and communication skills [39]. These methods align with the principles of social constructivism, emphasizing that learning is most effective when it is a shared and interactive process. integrating AR through gamification, storytelling, and collaborative tasks enhances both individual and group learning outcomes [12]. These strategies align with modern pedagogical approaches, emphasizing interaction,

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engagement, and meaningful communication, while reflecting the essence of social constructivism in creating a dynamic and effective language learning environment.

5. Integration Challenges

Despite its potential, AR adoption faces barriers such as high costs, lack of teacher training, and technical difficulties. Additionally, the absence of AR-specific pedagogical frameworks limits educators' ability to implement it effectively. These challenges indicate a need for institutional support and teacher capacity-building programs to make AR a feasible tool in classrooms[40]. While AR holds significant promise for transforming language education, its adoption in classrooms is hindered by several barriers. Addressing these challenges requires institutional commitment and targeted capacity-building initiatives to ensure AR becomes a practical and sustainable educational tool. By fostering institutional support and equipping educators with the necessary skills and resources, AR can move from being an experimental technology to a transformative tool for 21st-century classrooms [41].

6. Research Gaps

The review identifies areas requiring further investigation:

a. There is limited research on how AR affects language retention and fluency over time.
b. Most studies focus on beginner or intermediate learners, leaving a gap in understanding AR's effectiveness for advanced proficiency levels.
c. Few studies explore how AR applications perform across different cultural and linguistic contexts.
d. Limited attention has been given to ensuring AR tools are accessible for diverse learner groups, including those with special needs.

These findings underscore AR's potential as a transformative learning media while highlighting areas for improvement and further exploration. Addressing the challenges and gaps identified can help AR's impact on English language education and support its integration into 21st-century learning environments. Gaps remain in the research, including limited empirical evidence on long-term learning outcomes, insufficient exploration of teacher training for AR integration, and a lack of standardized frameworks for evaluating AR effectiveness in English language education. Future research should address these gaps by conducting longitudinal studies, developing comprehensive training programs for educators, and establishing robust assessment tools to measure AR's impact on English language learning outcomes.

Conclusion

This systematic literature review explored the integration of AR in 21st-century learning media within the context of English language education. The findings highlight AR's significant potential in transforming traditional language

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learning environments by offering immersive, interactive, and personalized experiences. The review identified key benefits of AR, including enhanced student engagement, increased motivation, improved language retention, and the development of critical 21st-century skills such as creativity, collaboration, communication, and critical thinking. By enabling experiential and problem-based learning, AR creates dynamic learning environments that are more aligned with the real-world use of language. Moreover, the review examined various AR applications and frameworks that have been implemented to support language education, noting that AR can provide opportunities for contextualized language practice, cultural immersion, and instant feedback. The implications of these findings for future research and practice in English language education are multifaceted: 1) Curriculum Design and Instructional Practices; 2) Professional Development and Teacher Training; 3) Technological Infrastructure and Accessibility; 4) Further Research on Long-Term Outcomes; and 5) Cultural and Linguistic Considerations.

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Author Contributions

Winda Trisnawati: conceptualization; formal analysis; data curation; methodology; writing- review and editing. Urip Sulistiyo: data curation; methodology; writing- review and editing. Sofyan: formal analysis; data curation; methodology; writing- review and editing. Eddy Haryanto: writing-original draft; writing- review and editing. Ashadi Bashir: formal analysis; data curation; writing-review and editing.

Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

Additional information

No additional information from the authors.

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