

International Journal of Learning, Teaching and Educational Research
Vol. 25, No. 2, pp. 1-24, February 2026
<https://doi.org/10.26803/ijlter.25.2.1>
Received Oct 11, 2025; Revised Jan 18, 2026; Accepted Jan 19, 2026

The Impact of Augmented Reality on Motivation, Engagement and Language Proficiency in EFL Education: A Systematic Review

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Abstract. Although Augmented Reality (AR) has gained increasing attention as an innovative tool in English as a Foreign Language (EFL) education, existing empirical findings remain fragmented, context-bound, and lack a systematic synthesis that integrates affective and cognitive learning outcomes alongside methodological trends. In particular, limited systematic reviews have explicitly examined how motivation, engagement, and language performance are analysed and interpreted across recent AR-based EFL studies. Addressing this gap, this study presents a systematic review of the effects of AR on motivation, engagement, and language performance in EFL education. Guided by the PRISMA 2020 framework, 14 empirical studies published between 2022 and 2025 were systematically identified from the DOAJ, ERA, and ERIH Plus databases. Data were analysed using descriptive trend analysis to examine research designs, samples, educational contexts, and targeted language skills, complemented by thematic synthesis to identify recurring analytical patterns and dominant research themes. The findings demonstrate that AR integration consistently produces positive effects on affective outcomes, including learner motivation, engagement, collaboration, and anxiety reduction, as well as cognitive outcomes such as improvements in reading, listening, speaking, and vocabulary performance. Regional analysis indicates that studies conducted in Arab countries report moderate but steady gains in motivation and achievement, though large-scale adoption remains constrained by limited infrastructure and insufficient teacher preparedness. In Malaysia, emerging studies reveal positive teacher attitudes and encouraging outcomes, particularly in speaking and reading skills, highlighting AR's potential alignment with national educational reforms. Three dominant research themes are identified: (1) comparative effectiveness of AR-enhanced and traditional instruction, (2) curricular integration and teacher professional development, and (3) affective engagement and

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experiential learning processes. Overall, the review concludes that while AR represents a powerful pedagogical innovation aligned with constructivist and experiential learning principles, its sustainable impact depends on systematic pedagogical design, robust data-driven evaluation, and comprehensive teacher training.

Keywords: Augmented Reality in Education; English as a Foreign Language (EFL); Motivation and Engagement; Language Learning Achievement

1. Introduction

Augmented Reality (AR) and its application in language instruction have received increasing global attention due to their potential to transform conventional teaching and learning practices. AR refers to a technology that integrates virtual elements with the real-world environment in an interactive and immersive manner, enabling learners to experience digital content within authentic contexts (Khodabandeh et al., 2025).

In real-world English as a Foreign Language (EFL) classroom, teachers continue to face persistent challenges, including low student motivation, limited active engagement, anxiety in language use, and difficulties in sustaining meaningful interaction, particularly in skills such as speaking and reading comprehension. These issues are further exacerbated in contexts where English is not frequently used outside the classroom, resulting in passive learning environments that rely heavily on textbooks and teacher-centred instruction. Consequently, there is a growing demand for instructional approaches that can increase learner engagement while supporting authentic language use.

Recent empirical studies suggest that AR has the potential to address these classroom-level challenges by enhancing learner motivation, engagement, and confidence. For instance, experimental evidence indicates that AR-supported language learning environments foster positive learner attitudes towards English, increase self-confidence, and stimulate sustained interest in learning materials (Ustun et al., 2022). By offering interactive and visually enriched experiences, AR can reduce the monotony often associated with traditional language instruction and create more meaningful learning experiences (Ustun et al., 2022).

Beyond affective outcomes, AR has also demonstrated positive effects on language achievement. A meta-analysis by Yang and Zhang (2025) reported a moderate positive impact of AR on EFL learners' language proficiency, suggesting that AR can contribute not only to motivation but also to measurable learning gains. However, the same meta-analysis highlights that AR effectiveness is influenced by contextual factors such as educational level, instructional design, and targeted language skills (Yang & Zhang, 2025), underscoring the need for pedagogically grounded implementation.

From a theoretical perspective, AR aligns closely with situated learning and social constructivist principles by allowing learners to interact with multimodal content,

including 3D objects, sounds, and images that mirror real-world language use (Wedyan et al., 2022). Such experiences support active knowledge construction, collaboration, and problem-solving, as learners engage meaningfully with content and peers through AR-based activities (Khodabandeh et al., 2025; Wedyan et al., 2022). Despite these theoretical and empirical strengths, real-world implementation of AR in EFL education remains uneven. Practical constraints such as limited technological infrastructure, insufficient teacher training, and uncertainty regarding sustainable integration continue to hinder large-scale adoption, particularly in developing and middle-income educational contexts.

More importantly, although numerous studies have examined AR in isolated settings, explicit gaps remain in the literature. Existing research is often fragmented, focusing on single language skills, specific regions, or short-term interventions, with limited synthesis of how motivation, engagement, and language performance interact across diverse contexts. Furthermore, there is a lack of systematic reviews that critically examine recent empirical evidence while identifying regional patterns and dominant research themes. These gaps restrict educators' and policymakers' ability to make informed decisions regarding the pedagogical and strategic use of AR in EFL education.

To address these limitations, the present study systematically reviews recent empirical studies on AR in EFL education, focusing on motivation, engagement, and language performance across global, Arab (Middle Eastern), and Malaysian contexts. The findings of this study are expected to offer practical implications by informing teachers about effective AR integration strategies, guiding curriculum developers in aligning AR with pedagogical objectives, and supporting policymakers in making evidence-based decisions related to teacher training and technological investment. Ultimately, this study contributes to a clearer understanding of how AR can be meaningfully and sustainably leveraged to enhance EFL learning in real educational settings.

The research questions were developed using the SPIDER model (Table 1), which was introduced by Cooke et al. (2012) as an alternative to the PICO model, particularly suited for qualitative or mixed-method studies. This model is especially helpful in guiding researchers to formulate systematic literature review questions that focus on experiences, perceptions, and educational phenomena.

Table 1: SPIDER Model

No.	SPIDER Model Element	Content in the Study
1.	S: Sample	EFL learners at various educational levels.
2.	PI: Phenomenon of Interest	The use of Augmented Reality (AR) in EFL learning.
3.	D: Design	Empirical studies (quantitative, qualitative, or mixed method).
4.	E: Evaluation	The effects of AR on motivation, engagement, and language skills.
5.	R: Research Type	Empirical studies within the context of education.

1. What are the objectives, population and sample, methodology, and research findings used in studies related to the use of Augmented Reality technology in the teaching and learning of English as a Foreign Language (EFL)?
2. How does the use of Augmented Reality influence motivation, engagement, and language skill achievement among EFL learners?
3. What pivotal research themes underpin the development and growth of Augmented Reality in English literacy education, particularly in the context of English as a Foreign Language (EFL) learning?

2. Literature Review

2.1 Global Perspectives on AR in EFL Education

In EFL learning, studies on AR demonstrate a positive trend, which is uniform worldwide, to accelerate motivation, engagement, and language success. In a meta-analysis of 22 empirical studies (2010- 2022) by Yang and Zhang (2025), the researchers observe a moderate and positive impact of AR on the language abilities of learners. But the level of effectiveness differed according to the level of education, methods of teaching the languages, and the language skills intended (Yang & Zhang, 2025). It implies that the method of AR used by educators should be adjusted to the level of learners and the desired learning outcomes. Likewise, a systematic analysis by Wedyan et al. (2022) has found that AR has the potential to enhance language proficiency and academic achievements and minimize the anxiety of learners.

The qualitative results they obtained showed that students and teachers had a positive attitude towards AR and considered it an instrument that made the learning process more interesting, imaginative, and cooperative (Wedyan et al., 2022). Concerning motivation and engagement, Ustun et al. (2022) found that student motivation in classes with the use of AR activities increased significantly as compared to traditional classrooms. The interactive AR experience increased the level of students' interest, their positive attitudes to English, and their level of self-confidence (Ustun et al., 2022). Similarly, Liu et al. (2023) found that AR-based instruction fostered active participation and deepened cultural understanding among EFL learners in China (Liu et al., 2023).

On the whole, the international research community considers AR to be a beneficial stimulator of language acquisition as it increases the motivation, activates the engagement process, and promotes the vocabulary, fluency, and comprehension growth in case of the implementation of suitable pedagogical strategies (Liu et al., 2023; Wedyan et al., 2022). Nevertheless, researchers warn that further studies are necessary to determine how AR may impact motivation and communication competence in the long run (Liu et al., 2023). These results indicate the innovative potential of AR to be used as an addition to traditional instruction, given that it has to be implemented with the help of careful planning and adequate infrastructure.

2.2 Implementation of AR in EFL Education in Arab (Middle Eastern) Countries

AR application in EFL education is still at its early stages in the Arab Middle East, and there is a lack of empirical research in the area compared to the rest of the

world (Bamanger, 2025). According to Bamanger (2025), despite the high potential of AR technology, its use in education is still limited to a small number of selected countries, such as Saudi Arabia, Egypt, and Palestine, and there is little evidence of applying it in other countries, such as Yemen. This is explained by the fact that educators are not aware of and trained about AR (Bamanger, 2025a). However, the current research reveals favorable results in line with international results. As an example, Kamarudin et al. (2021) discovered that AR-based learning enhanced the engagement of Saudi students in online classes in English because they were more willing to perform language tasks than using traditional approaches (Liu et al., 2023).

Sabbah et al. (2023) also find motivation benefits of AR supported by empirical evidence in Palestine. Students who studied through AR rated higher in motivation dimensions: attention, relevance, satisfaction, and desire, as compared to the control group in their experiment. Likewise, in a quasi-experimental study conducted in Yemen by Bamanger (2025), students exposed to AR-based instructional programmes obtained considerably higher scores of English proficiencies (mean 76.80 vs 69.83) with a moderate effect size (Cohen's $d \approx 0.52$). This is an indication that the AR integration improved the language mastery of the students using more elaborate experiences like audio of native speakers, 3D visualisation, and interactive language games (Bamanger, 2025).

Even though the number of studies in the Middle East is still not large, the results show the transferability of the AR benefits. The use of AR leads to greater motivation and interest among Arab students, and more teachers appreciate the pedagogical importance of AR (Bamanger, 2025; Liu et al., 2023). In order to encourage broader adoption, the scholars suggest enhancing the training of teachers and the infrastructural preparedness (Bamanger, 2025). All in all, Middle Eastern literature shows the promising nature of AR in improving the motivation, engagement, and achievement of EFL learners, should it be properly adapted to local cultures and presented using bilingual and culturally competent content.

2.3 Use of AR in EFL Education in Malaysia

The adoption of AR in the EFL learning process has attracted increasing interest in Malaysia, but there is still a shortage of empirical studies in the area. The existing research primarily concerns the perceptions of teachers and the readiness of infrastructures. In a survey conducted on 181 English teachers in the secondary school in the Klang Valley, Mohamed Jamrus and Razali (2021) have identified high acceptance and readiness of using AR in reading lessons. More than 60% of the respondents were positive about embracing AR, and a strong relationship was determined between acceptance and intention of teachers to employ AR (Jamrus & Razali, 2021).

These results imply that the Malaysian teachers have a positive attitude toward AR and that they are the main facilitators of its use. The Ministry of Education Malaysia has also been interested at the policy level in introducing AR into language education, but a large-scale implementation still needs comprehensive research (Jamrus & Razali, 2021). This highlights the importance of local empirical

data so as to make sure that it is in line with Malaysian curricular and learner requirements.

In Malaysia, there are encouraging results of a number of small-scale studies. Mohd Nabil et al. (2024) explored the application of AR filters in the teaching of speaking skills remotely to students of the ESL secondary level. The results showed that AR filters offered an interactive environment to learn oral communication in a simulated setting (Nor Sanak et al., 2024). The educators were indicating a higher involvement of students and their confidence, mentioning that AR features ensured that speaking tasks were more interactive and enjoyable. In addition, AR helped teachers to give individual feedback by analysing pronunciation in AR videos, which expedited the learning process in learners (Nor Sanak et al., 2024). These findings are consistent with the evidence available around the world, indicating that AR advances the English fluency, pronunciation, and motivation among learners.

Despite the fact that the current research situation in Malaysia is not so developed, positive attitudes towards the teachers and promising pilot studies show that the widespread implementation is possible. Among them, such issues as the readiness of infrastructure, the creation of AR content aligned with the curriculum, and teacher training to design activities are important. Through coordinated research, technology development, and the Ministry of Education, Malaysia can join the ranks as one of the leaders in AR-based language learning, promoting motivation, engagement, and proficiency with the assistance of contextually relevant and sustainable practices (Jamrus & Razali, 2021).

3. Methodology

The PRISMA approach was used to advance the systematic review to promote transparency and methodological rigour. This method entails setting up inclusion and exclusion criteria by use of a systematic review process, which involves identification, screening, inclusion, and data extraction and analysis. The databases employed in this study were DOAJ, ERA, and ERIH Plus, as they provide broad coverage of peer-reviewed journals in education and related fields, including studies on the use of Augmented Reality (AR) in English as a Foreign Language (EFL) instruction.

Moreover, the PRISMA protocol was used to inform methodologies like search string development and reporting in order to make the findings transparent and comprehensive. The methodology is in tandem with the latest PRISMA Statement (Preferred Reporting Items to Systematic Reviews and Meta-Analyses) updated by Page et al. (2021).

PRISMA has three principal strengths:

1. Well-formulated research questions, which allow a systematic review to be conducted;
2. Determines intensive inclusion and exclusion criteria; and
3. Helps in assessing a great amount of scientific literature in a specified period.

This systematic review had three important stages, as shown in Figure 1:

1. identification,
2. screening, and
3. eligibility

We have followed the PRISMA, which is evidence-based and helps to achieve complete and clear reporting in the systematic literature review. This openness and full disclosure are essential to guarantee the quality of the research, since it gives the readers an opportunity to judge the research procedures and the validity of the findings (Sarkis-Onofre et al., 2021). This study was meant to determine the impact of the Augmented Reality technology on the different learning strategies, especially in problem-solving, in the teaching and learning environments.

The aim of this review was also to derive similarities among the previous research by classifying them based on the nature of the AR technology and the methods applied in teaching. The keywords applied to the database search included augmented reality, learning strategy, and teaching strategies. The search was done using the DOAJ, ERA, and ERIH Plus databases. It initially produced 267 results. But only 14 studies were considered relevant in accordance with the following criteria:

1. The research indicated the evident connection between the Augmented Reality technology and English as a Foreign Language;
2. The study was published between 2022 and 2025; and
3. The study contained empirical data or constituted a literature review.

After analysis using the systematic literature review method adapted from Page et al. (2021), the findings of this study were summarised as shown in Table 1.

Table 2: Search strings used for the systematic review process

Database	Boolean Operator Used
DOAJ	("Augmented Reality" OR "AR") AND ("English as a Foreign Language" OR "EFL")
ERA	("Augmented Reality" OR "AR") AND ("English as a Foreign Language" OR "EFL")
ERIH PLUS	("Augmented Reality" OR "AR") AND ("English as a Foreign Language" OR "EFL")

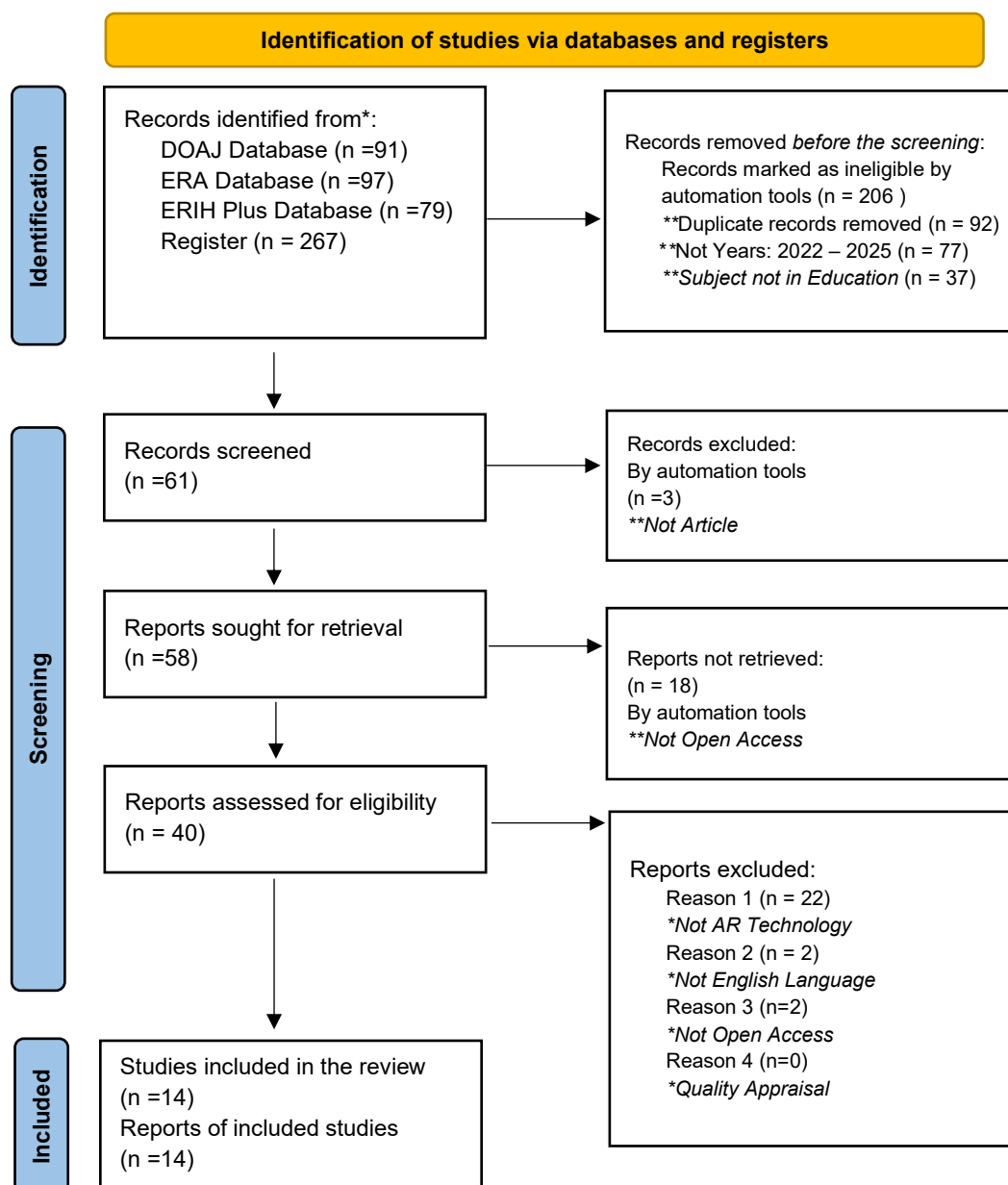


Figure 1: The flow diagram of the study. (Adapted from Page et al. (2021))

3.1 Identification

The identification of studies was conducted through a systematic search of four primary sources, namely the DOAJ Database (n = 91), ERA Database (n = 97), ERIH Plus Database (n = 79), and registered records (n = 267). In total, 534 records were identified during the identification phase, as illustrated in the PRISMA flow diagram (Figure 1). During the initial filtering process, 206 records were automatically removed as they did not meet the preliminary inclusion criteria, including document type, subject relevance to education, or publication outside the targeted timeframe of 2022–2025. In addition, 92 duplicate records were removed. Following this initial screening, 61 records remained and were subjected to further screening and eligibility assessment.

3.2 Screening

Among the 61 articles that were screened, 3 articles were automatically filtered via automation tools as a result of failing to satisfy the eligibility criteria of being a full-text study. The remaining 58 articles were screened regarding full-text access, but 18 of them were not available because there are limits in the Open Access Resources. Forty articles were managed to find and undergo another eligibility evaluation according to the set inclusion criteria.

3.3 Included

Out of 40 articles that were considered, only 14 articles were included in this review after a strict eligibility review. Articles were sifted out due to the following reasons:

- 22 articles were not directly related to Augmented Reality (AR) technology,
- 2 articles were not written in English,
- 2 articles were not Open Access, and
- 4 articles failed to meet the minimum threshold in the quality appraisal score.

Thus, only the articles that met all the inclusion criteria, such as the relevance of the topic to the study, the availability of Open Access, and the quality of the methods used, were included in the analysis in this systematic review.

3.4 Quality Appraisal

In order to be able to include only high-quality articles in this Systematic Literature Review (SLR), a quality appraisal process was done on each of the selected articles. The assessment instrument used was adapted from Abouzahra et al. (2020), comprising six core criteria:

1. Specificity of the research objectives
2. Applicability and value of the study
3. Methodological transparency
4. Suitability of the conceptual approach
5. Comparison with current literature
6. Adequacy in presenting the limitations of the study

All the criteria were rated on the 3-point Likert scale with a 'Yes' (1 point), 'Partially' (0.5 points), and 'No' (0 points). The maximum score per article was 6 points. Only articles scoring above 3.0 (at least 50%) were considered of sufficient quality and eligible for inclusion in the SLR analysis. This approach ensured a systematic, transparent, and consistent assessment process, thereby enhancing the reliability of the review's findings. All fourteen articles included in the systematic review (A1-A14) were subjected to the quality appraisal process and are fully represented in Table 3.

Table 3: Article Quality Appraisal Results

ID	C1	C2	C3	C4	C5	C6	Score
A1	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A2	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A3	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A4	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A5	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A6	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A7	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A8	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A9	1.0	1.0	1.0	1.0	1.0	1.0	2.0
A10	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A11	1.0	1.0	1.0	1.0	1.0	0.5	5.5
A12	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A13	1.0	1.0	1.0	1.0	1.0	1.0	6.0
A14	1.0	1.0	1.0	1.0	1.0	1.0	6.0

A = Article, C = Criterion Question

3.5 Data Analysis

Following the study selection process, data analysis was conducted in two systematic stages. First, a descriptive analysis was performed to summarize the characteristics of the included studies, including publication year, educational level, sample population, research design, targeted language skills, and geographical context. This analysis enabled the identification of research trends and patterns across the selected studies.

Second, a thematic analysis was employed to synthesize qualitative findings related to the effects of Augmented Reality (AR) on motivation, engagement, and language performance. Relevant findings were coded and categorized based on recurring concepts, which were subsequently organized into overarching themes. This approach facilitated an integrative interpretation of affective and cognitive outcomes reported in the literature.

4. Results

4.1 Characteristics of Empirical Studies on AR in EFL Education

Table 4: Critical Analysis of the Studies

Author(s)	Objective	Sample/ Population	Method	Key Findings	Conclusion
Cai et al. (2022)	To explore the use of AR in foreign language teaching and its impact.	Not specified (literature review).	Qualitative document analysis.	AR enhances motivation, participation, and learning outcomes. Focus on English.	AR is effective and aligns with CEFR. Further research needed on cost and reading/writing skills.
Çelik & Yangın	Effects of AR in CLIL lessons and	76 secondary school	Quasi-experiment: achievement	AR group showed significant	AR enhances achievement and

Author(s)	Objective	Sample/ Population	Method	Key Findings	Conclusion
Ersanlı (2022)	student attitudes.	students (Turkey).	test & questionnaire	improvement. Student attitudes were positive.	engagement. Recommended for EFL teaching.
Semenova et al. (2022)	Effects of AR on non-linguistic students' motivation in learning EFL.	68 first-year students (Russia).	Control-experimental design, survey & interview.	AR improved motivation, comprehension, performance, and communication.	AR holds strong potential as a didactic tool in language learning.
Yulian et al. (2024)	Design and evaluation of AR app for reading skills.	37 non-English major students.	ADDIE model, pre/post-test, questionnaire	Post-test scores increased (81 vs 51). Students' perceptions were very positive.	AR is effective for low-level learners; suitable for reading and speaking.
Parlar et al. (2025)	Effects of AR in EFL listening courses.	84 fifth-grade students (Turkey).	Quasi-experiment; ADDIE, t-test.	Significant improvement in listening performance and student attitudes.	AR is very effective and enjoyable. Should be expanded to other levels.
Yulian & Sirat (2024)	Relationship between self-efficacy, attitude, and AR learning.	213 ESP students (Indonesia).	Survey; SmartPLS & SEM model.	Self-efficacy had positive effects on all learning dimensions.	Self-efficacy is important in AR use; attitude only affects motivation and context.
Al-Khresheh et al. (2024)	Effects of AR on vocabulary learning among special needs EFL students.	30 special needs students (9 years old).	Quasi-experiment; vocabulary test.	AR group performed better in all aspects of vocabulary learning.	AR is highly beneficial for vocabulary learning among special needs students.
Asadi & Ebadi (2025)	Effects of AR on reading comprehension and teachers' perceptions.	98 EFL students (B1 CEFR), aged 22-36.	Mixed-method; test & interview.	Reading scores improved significantly. Teachers viewed AR positively.	AR is effective and encourages motivation. Requires well-designed intervention.
Okumuş & Savaş (2024)	EFL pre-service teachers' acceptance and self-	50 pre-service teachers (Ankara).	Mixed-method; questionnaire & interview.	Increased AR acceptance. No significant change in self-efficacy.	Technology training needed for pre-service teachers. AR well accepted

Author(s)	Objective	Sample/ Population	Method	Key Findings	Conclusion
	efficacy with AR.				but needs support.
McDermott et al. (2023)	AR/VR in higher education in Ireland.	Students from various programmes	Qualitative study & literature review.	Still in early stages; no quantitative data.	Great potential for immersive learning experiences.
Rehab & Aliweh (2024)	Effects of inquiry-based AR on reading comprehension and engagement.	66 female Form 1 students.	Experiment; 30 sessions, 40 minutes each.	Significant gains in reading scores; increased engagement.	Inquiry-based AR is effective for literal, inferential, and critical reading skills.
Rojabi et al. (2023)	Review of mobile AR in EFL.	Not specified.	Literature review.	AR improved achievement, interaction, and motivation.	Mobile AR suits active learning; technical issues must be addressed.
Bagus et al. (2024)	Student perceptions of AR in reading class.	51 students (quant), 5 students (qual).	Mixed-method; questionnaire & interview.	AR supported text comprehension and encouraged interaction.	AR increases interest and engagement in reading. Suitable for secondary students.
Fitayanti (2024)	Development of AR module for assessing speaking skills.	45 EFL students (Indonesia).	Pre-post test, interview, observation.	Speaking scores improved from 2.4 to 3.9.	AR module significantly improves confidence and speaking skills.

4.1 Effects of Augmented Reality on Motivation, Engagement, and Language Skill Achievement

The findings of the reviewed studies indicate that the use of Augmented Reality (AR) technology in the context of English as a Foreign Language (EFL) learning has a positive impact on multiple aspects of language acquisition, including vocabulary development, reading comprehension, listening skills, and oral communication. The majority of the studies reported considerable improvements in student achievement, motivation, and engagement, particularly in skills that require contextual understanding and active language use.

For instance, Cai et al. (2022) reported that AR-supported instruction enhanced learners' motivation and engagement while facilitating better comprehension of language content through interactive and contextualised learning experiences. Similarly, students who participated in AR-based CLIL (Content and Language Integrated Learning) lessons demonstrated higher achievement in language-related tasks, such as understanding subject-specific vocabulary and applying

language skills in meaningful contexts, compared to those in non-AR-based environments, and they also expressed more positive attitudes towards learning English (Çelik & Yangin Ersanlili, 2022).

AR has also been found to be effective in relation to the motivation of learners, especially the non-linguistic students. According to Semenova et al. (2023) the AR technology was shown to greatly enhance the motivation of students to study a foreign language through involving the use of engaging visual and interactive techniques. A comparable result was found by Yulian et al. (2024), in which the application of an AR resulted in an increase in the reading test scores and a very favorable perception of the non-English major students. Parlar et al. (2025) found a significant enhancement of listening skills of students who were enrolled in AR-based courses of listening, and that learning was enjoyable and efficient due to the use of animations and situational contexts.

In the meantime, Yulian et al. (2024) studied the connection between self-efficacy, attitude, and self-directed AR learning. They discovered that self-efficacy was a key element in effective AR-based learning, especially as far as motivation and learning behaviour are concerned. According to Al-khresheh et al. (2024), vocabulary tests were performed using AR technology that helped the students with special educational needs perform better than without the technology. The power of AR was reflected in the power of this group to recognize, remember, and produce words.

Asadi and Ebadi have also found that the scores in reading comprehension of EFL learners had considerably improved after the application of an AR. Those teachers participating in the research gave a positive response, saying that they have witnessed more engagement and motivation in their students. In the case of pre-service teachers, Okumuş & Savaş (2024) found that acceptance of AR technology increased after a 10-week exposure time, but there was no significant increase in self-efficacy. This implies that AR needs to be incorporated in teacher training programmes through technical support and early training.

On the higher education level, Dermott et al. (2023) emphasized that AR/VR technologies and 360-degree learning are promising in terms of enhancing the learning experience, but little quantitative data is available. Rehab and Aliweh also found that the use of inquiry-based AR activities was associated with a high level of reading comprehension and engagement among students, especially the literal, inferential, and critical reading abilities. The same results were highlighted in the study conducted by Rojabi et al., (2023) who put more emphasis on the role of AR in the achievement and motivation of students overall. As Bagus et al. (2024) observed, AR enhanced the concept of better text understanding and more engagement among students throughout the reading sessions, and most students gave positive feedback on the technology. Moreover, the article by Fitayanti confirmed that an AR-based assessment module was a significant tool to enhance the speaking skills of students, and the average score has risen between 2.4 and 3.9 after the intervention.

4.2 Conceptual Network Analysis Using VOSviewer on AR in EFL Education

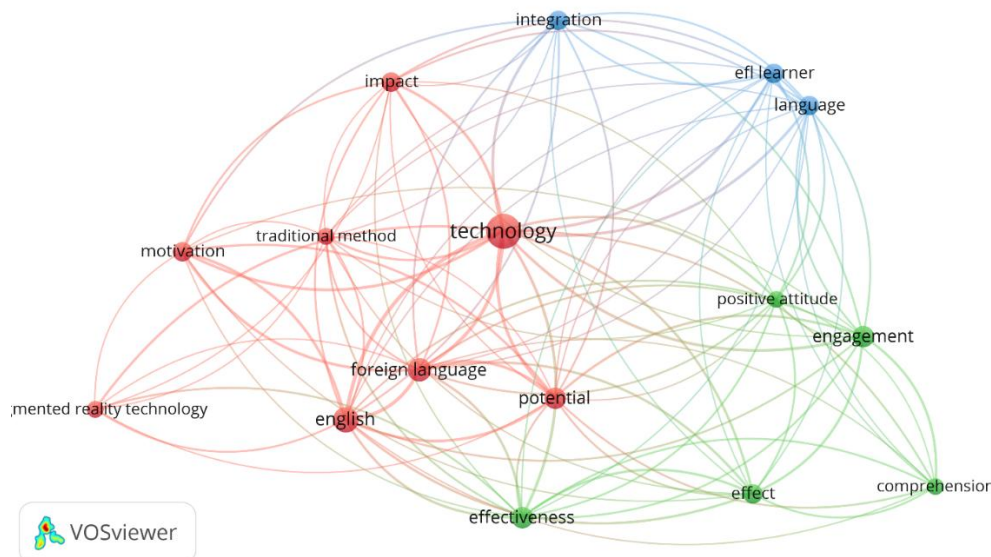


Figure 2: Keyword Co-occurrence Network Analysis in Augmented Reality (AR) Research for Teaching English as a Foreign Language (EFL)

VOSviewer can be successfully used to determine patterns of relationships between major concepts in a specific area of research using a visual method. The network of keywords examined in this paper reflects the network of keywords associated with applying Augmented Reality (AR) to teach and learn English as a Foreign Language (EFL). Through the frequency and co-occurrence of terms in the literature presented in the visualization, the existing trends in the research, the key areas of interest, and the possible future direction of the AR integration into language education are identified.

The highest number of nodes in the first cluster (depicted in red) highlights the significance of the word *technology*, which is used as the focal point in the network. It is strongly connected with such keywords as “*traditional approach*”, “*motivation*”, “*foreign language*”, “*English*”, “*influence*”, as well as “*augmented reality technology*”. These relations imply that the literature is mostly focused on comparison between conventional teaching strategies and those based on technology implementation, especially AR. This cluster also includes the term “*motivation*”, which allows concluding that there is significant interest in the role of AR in terms of influencing learner motivation, and its connections with the terms “*foreign language*” and “*English*” make it obvious that it is widely used in EFL.

The second group, depicted in blue, is concerned with the assimilation of AR technology in learning institutions. Keywords like “*integration*”, “*EFL learner*”, and “*language*” can be seen as one of the central purposes of the study to focus on how AR can be integrated into the classroom and how EFL learners experience and react to its implementation. The studies in this cluster also tend to emphasize the necessity of adapting the curriculum and developing pedagogical techniques

that would be in line with the changing technological context and the demands of digital-centered learners.

The third cluster, as depicted in green, includes such terms as “engagement”, “positive attitude”, “effectiveness”, “effect”, and “comprehension”. The issues raised in this cluster are in relation to the impact of instruction and student learning experiences. The keywords of “engagement” and “positive attitude” indicate that AR is not only considered a technological platform, but also a platform to increase the engagement and attitude of the learners in the language learning process. In the meantime, the terms that are used to denote cognitive outcomes include “comprehension” and “effectiveness”, which denote an emphasis on cognitive outcomes, including the understanding and academic performance in the AR-based learning settings.

One important note that comes out of this conceptual map is the existence of cross-cluster relationships, which represent the fact that AR is a mediating process between technological, pedagogical, and psychological aspects of learning. The word “potential”, which is placed at the intersection of a few clusters, indicates the general view of the ability of AR to enhance instructional quality and learning effectiveness. The high density of the connections between the keywords demonstrates that the holistic approach, which implies technology, motivation of learners, active engagement, and designing of pedagogy, is the primary factor that preconditions the success of AR in foreign language education.

To sum up, the presented concept network analysis shows that the studies concerning AR in EFL teaching are varied but related. The discipline does not merely emphasize technological effectiveness but also focuses on student experiences, emotional aspects, and lifelong learning results. Therefore, a thorough and combined strategy is of the essence for future studies and practice. The development of technologies is not the only area to be examined in the future, but one should also consider how to develop meaningful and authentic interaction among learners in digitally augmented settings.

5. Discussion

5.1 Key Findings on the Use of AR in EFL Learning

The recent research concerning the application of Augmented Reality (AR) technology in the teaching of English as a Foreign Language (EFL) is primarily concerned with the ability to determine the efficacy of the AR in improving the language acquisition and the motivation of a student. The majority of researchers used a quasi-experimental or controlled experimental design, involving treatment groups (AR) and the control groups (traditional methods) (Bamanger, 2025b; Belda-Medina, 2025).

As an example, Belda-Medina (2025a) carried out a quasi-experimental study in 1 semester occupied by secondary school students, whereby the experimental group received instruction guided by AR-based CLIL and the control group was instructed using traditional textbooks. Equally, a pre-test and post-test design was adopted by Al-Khreshah et al. (2024), who used 30 preschool children with special

needs and concluded that vocabulary acquisition results in the group that learnt the new vocabulary with the help of AR were significantly higher than those in the control group, where standard methods were used. The general EFL population of AR research is very diverse and includes early childhood students, secondary students, non-language undergraduates, as well as pre-service teachers. As an example, Semenova et al. (2022a) have focused on first-year students in the sciences (non-language majors) to study the impact of AR on motivation in learning English chemical language.

In the meantime, Okumuş and Savaş (2024) target pre-service teachers, thus presenting a group of 50 students of English education with a 10-week AR training programme and collecting data at the beginning and end of the intervention using the Technology Acceptance Model (TAM) survey and self-efficacy scales. In general, the aims of these studies are similar, namely, to investigate how AR is applicable to improve language attainment (e.g., reading, listening, speaking, vocabulary) and such affective aspects as motivation, interest, and attitudes.

Regarding the findings, the results are always positive. Nearly all studies showed an improvement in the achievement of students who worked with AR than with traditional methods. Wu et al. (2024) observed in a meta-analysis study that AR was both significantly and generally effective in language mastery and moderately effective in student motivation. Other studies that were skill-related yielded the same results. As one of the examples, Parlar and Sutcu (2025) have identified that students who studied listening skills through an AR-based learning program demonstrated a high level of improvement and also indicated that learning was more enjoyable.

Asadi and Ebadi (2025) conducted the study in the reading field by applying a mixed-method research design (reading tests and interviews with teachers) and discovered that the reading comprehension scores of students had increased significantly when an AR application was used. EFL teachers interviewed also added that students seemed to be more concentrated and motivated when the elements of AR were included in reading activities (Asadi & Ebadi, 2025). In the same vein, Rehab and Aliweh (2024), who introduced AR-based inquiry reading activities, reported significant positive changes in the literal, inferential, and critical comprehension reading skills of secondary students and the increased engagement in the classroom. Similar findings were also made by Rojabi et al. (2023), who pointed out that AR apps can be used to improve academic achievements and the overall student motivation.

Further, AR was also applicable to the special-needs learners. That is, students with special needs in Al-Khresheh et al. (2024) showed significant differences in vocabulary tests in the form of recognition, recall, context, and word production when the AR-supported materials were involved. The other field that turned out to be helpful was speaking skills: Fitayanti (2024a) created an oral assessment module in AR and discovered that the average speaking score of students rose substantially between 2.4 (pre-test) and 3.9 (post-test), and that fluency and confidence levels increased significantly. On balance, the results of all these

studies indicate that AR can be a potent tool of innovation in learning that can enhance EFL performance in terms of various language competences, learning environments, and groups of learners.

5.2 Effects of AR on Motivation, Engagement, and Language Skill Achievement

It has been discovered that the introduction of AR to the EFL learning process positively affects the motivation and active participation of students. AR technology makes the learning process more engaging and immersive, thereby making the learning process more attractive than the conventional way of doing things (Bamanger, 2025; Belda-Medina, 2025). Belda-Medina (2025) demonstrated that not only did the students in the AR-based groups get higher test scores, but students were also found to be more motivated and emotionally engaged in learning English. AR assists in increasing students' interest and attention as it involves the digital components of the animation, sound, and image that make the process of learning more pleasant and provoke interest (Belda-Medina, 2025; Wu et al., 2024).

Similarly, Semenova et al. (2022) revealed that AR can be a strong motivational factor; non-language major students learning scientific terminology through AR applications displayed much higher interest and willingness to learn due to the interactive and visual presentation of information. The researchers concluded that AR has a great didactic potential in language learning as it could stimulate the interest of learners and promote their level of understanding through visual experiences (Semenova et al., 2022). In the opinion of students, attitudes towards the use of AR have been in favor of the use of AR by a significant majority.

As an example, in research by Yulian et al. (2024) concerning AR-based reading applications, students of non-English major universities reported a highly positive attitude, stating that AR simplified the reading process and their reading performance was significantly improved. Students also reported being satisfied and enjoying working with the learning material through AR. In the same tone, Nyudak et al. (2024) established that the majority of students enjoyed the use of ARs because they helped them understand the text and gained more attention in the classroom.

AR has demonstrated obvious improvements in several aspects in terms of language proficiency. AR uses the visual quality of vocabulary learning, especially since it allows association of objects or images with the direct meanings of words. According to the study by Al-Khresheh et al. (2024), the use of immersive AR cards gave preschool learners an advantage in recalling and pronouncing English words over non-AR situations. The ability to read and understand also increased with the presence of AR, which gave more contextual clues. According to Asadi and Ebadi (2025), an AR reading application properly designed was able to improve the reading comprehension scores among intermediate adult learners, which in turn was reinforced by the feedback of the teachers that AR allowed the students to concentrate on the text and read it longer (Asadi & Ebadi, 2025).

Moreover, AR induced active engagement with reading materials, which allowed learners to discover the concealed meanings or visual clues that facilitated the adoption of critical reading skills, including inference and prediction (Rehab & Aliweh, 2024). In listening skills, AR applied to both game and real-world conditions showed higher performance. Parlar & Sütçü (2025) discovered that students who learned listening skills through the AR approach (i.e., listening to conversations in simulated real-life conditions) scored higher in the listening comprehension assessments than their peers who were taught the same skills through conventional methods. Such students also said that they felt less stressed and engrossed because AR was interactive and immersive.

Speaking was also an area where AR offered an opportunity to break the conventional restrictions of the classroom setting by providing a simulation of actual communicative situations. Students trained on oral assessment using the AR-based moral assessment module by Fitayanti (2024), they trained on speaking to virtual objects or avatars, which helped reduce fears in front of the real audience. These findings revealed significant improvements in fluency and confidence, with average speaking scores rising by 3.9 following the intervention.

The impact of AR on motivation and achievement is positive and is closely related to such psychological aspects as self-efficacy and attitude. The authors indicated that students who were more confident in using AR technology had greater engagement and self-directed learning (Yulian et al., 2024). This implies that self-efficacy is a catalyst since when students believe that they can use AR, adaptability to the use of AR is easier, and the inclination to access AR learning materials is enhanced. These results are consistent with the findings of Okumuş and Savaş (2024), who stated that pre-service teachers related low technical confidence to the lack of proficiency when using AR, even though they had a positive attitude. They emphasized that proper technical maintenance and early training would enhance the performance of AR by increasing the level of digital readiness and confidence.

On the whole, AR enhances the intrinsic motivation of students because it allows them to learn something more profoundly and meaningfully. Nonetheless, its inspirational impact could change as time and situation progress. According to Wu et al. (2024), the effects of AR on motivation are between small and moderate, which may indicate that novelty is also involved. The initial enthusiasm for AR needs to be held over a long period of pedagogical integration to ensure that high motivation is maintained. Therefore, even though there is evidence that AR tends to enhance motivation, the researchers have suggested that longitudinal research should be conducted to evaluate whether these motivational effects can be maintained when the AR is no longer believed to be new.

5.3 Key Research Themes in the Development of AR for EFL Literacy Education

The analysis of the literature shows that several fundamental research themes are the basis of the development and growth of Augmented Reality (AR) applications in English as a Foreign Language (EFL) literacy education. The former theme dwells on the comparison of conventional methods with technology-enhanced (AR) technology and their impact on learning outcomes. Numerous studies are aimed at establishing the degree of the ability of AR to substitute or supplement

traditional teaching, with a specific focus on academic success and student motivation (Bamanger, 2025; Belda-Medina, 2025). The keywords like “technology”, “traditional methods”, “impact”, and “motivation” are often used, and it is an indication of the prevalence of such comparative priorities. As an example, Bamanger (2025) indicated that AR-based learning experiences enhance the experiences of students with multimodal representation, as the barriers of time and space that could restrict the realities of conventional classrooms are overcome. These results are consistent with previous research and support the fact that AR has the potential to enhance academic performance using interactive methods. The significance of this theme lies in the fact that it offers empirical validation of the fact that investment in AR technology has quantifiable results in terms of teaching effectiveness.

The second significant theme deals with integrating the AR technology in the curriculum and pedagogy. The studies conducted in this field investigate the possibility of adapting AR to the real classroom setting and the best pedagogical tools that integrate it. Terms such as “integration”, “EFL learners”, and “language teaching” are widely used, which is a sign of an emphasis on the incorporation of AR into the instructional design. A number of studies emphasize the necessity to correspond curriculum goals to AR application (Dermott et al., 2023). Regarding teacher training, Okumuş and Savaş (2024) discovered that acceptance of AR improved over time and with training but did not vary much in the level of self-efficacy. This implies that AR-related elements in teacher education programmes need to be introduced earlier to equip future teachers with the competence as well as the attitude required to embrace AR.

The subthemes of digital literacy and teacher competence are also significant, and the studies also suggest workshops, seminars, and practical demonstrations as the methods to develop teacher confidence (Okumuş & Savaş, 2024). Besides, the integration of AR research has spread to post-secondary education. As an example, Dermott et al. (2023) investigated the concept of immersive technologies, including AR, VR, and 360-degree learning in universities, and found that this technology could improve the learning process, but it required the collection of more quantitative data before leading to its extensive use. This theme underscores the need to have a comprehensive integration approach that encompasses curriculum revision, teacher growth, and an ongoing review of the educational worth of AR.

The third important theme is associated with the learning experiences and the impact of AR that is affective. According to bibliometric analyses, the areas of interest of the researchers are emotional engagement and cognitive learning outcomes as clusters that include such terms as “engagement”, “positive attitudes”, “effectiveness”, and “comprehension”. The research tends to measure the emotional engagement of students, their attitude to technology-enhanced language learning, and their understanding of retention. According to Nyudak et al. (2024), AR addressed the learning needs of learners through adaptive and responsive learning environments, which led to more active and entertaining learning processes. Likewise, Fitayanti (2024) found that the confidence and

satisfaction with speaking skills among students improved with the AR-based testing and showed both the affective and cognitive advantages. This theme reinforces that the achievement of AR does not only depend on academic achievement but also on intrinsic motivation, long-term interest, and views towards language learning. AR, therefore, does not serve as an instrument but as a platform in developing interest and favorable learning attitudes (Nyudak et al., 2024).

Remarkably, the three themes are interrelated. Research indicates that AR acts as an intermediary to the world of technology, pedagogy, and psychology of learning. The phrases “potential” is repeated in the subject themes because there is a common ground of believing in the capacity of AR to transform the quality of language teaching. Their thick interrelationships imply that it is important to take the holistic approach: the technological innovation should be accompanied by good pedagogy and the human factors in motivation, anxiety, and digital literacy. Yulian et al. (2024), for instance, noted that self-directed AR learning is most effective when students possess high levels of discipline and self-efficacy, indicating that motivation and affective readiness directly influence integration outcomes. On the same note, comparative research indicates that AR effectiveness is determined by the quality of student engagement. Therefore, the present-day studies tend to encourage the cross-disciplinary cooperation of educational technologists, language educators, and educational psychologists in an attempt to create meaningful AR learning opportunities.

Conclusively, the thematic analysis testifies to the fact that AR study in EFL instruction is in the process of rapid development, with a variety of foci that are both complementary and diverse. Beyond analyzing the technical effectiveness of AR, scholars are also discussing the experiences of learners, the affective aspect of AR, and its system-wide pedagogical consequences. The existing study should be extended into the future by examining the long-term effect of AR on the subsequent generations of learners and their genuine communication abilities outside of the classroom.

Furthermore, the creation of a pedagogical framework of AR, including design principles and training of teachers, is bound to receive more interest. Through this focus on these central themes, the comparison with conventional approaches, curriculum, and engagement with learners, the area has great potential to promote innovation in English literacy learning. Prominent application of AR with the help of infrastructure and training will help to make sure that the immersive learning experience will actually improve the involvement of students and improve the language learning results.

6. Limitations and Recommendations

Despite the valuable insights generated from this systematic review, several limitations should be acknowledged. First, this review was confined to studies published between 2022 and 2025, which, although intentionally selected to reflect recent and post-pandemic developments in Augmented Reality (AR) implementation, may have excluded earlier foundational studies that could

provide historical perspectives on AR integration in EFL education. Second, the review relied on articles retrieved from the DOAJ, ERA, and ERIH Plus databases. While these databases offer substantial coverage of peer-reviewed educational research, relevant studies indexed in other databases may not have been captured. Third, the included studies demonstrated considerable variation in terms of educational levels, sample sizes, research designs, and targeted language skills, which limits the generalisability of the findings across all EFL contexts. In addition, most studies focused on short-term interventions, making it difficult to determine the long-term sustainability of AR's effects on motivation, engagement, and language proficiency.

Based on these limitations, several recommendations for future research are proposed. Future studies should consider extending the review timeframe and incorporating additional databases to provide a more comprehensive synthesis of AR research in EFL education. Longitudinal and large-scale empirical studies are also recommended to examine the sustained impact of AR on language development and learner motivation over time. Furthermore, future research should explore underrepresented educational contexts and learner populations, particularly in primary education and low-resource settings. From a pedagogical perspective, more attention should be given to the development of structured AR-based instructional frameworks that integrate curriculum alignment, teacher training, and assessment strategies. Such efforts would support more effective, scalable, and sustainable implementation of AR in EFL classrooms.

7. Conclusion

This is a systematic review that argues that Augmented Reality (AR) can be of great use in affecting the transformation of English as a Foreign Language (EFL) education by boosting motivation, engagement, and proficiency in language under various scenarios. The world, Middle East, and Malaysian research indicates that AR not only enhances academic results but also reinforces such affective variables as the confidence of the learner, their pleasure, and their self-efficacy. The interactive nature of AR enables the learner to experience the content of the language intensively by means of the authentic and visual experience as well as the contextualisation experience, thus closing the gap existing between the theory and practice. The studied articles also prove that AR can be applied to promote various language skills, reading, listening, talking, and vocabulary, as well as promote critical and reflective learning habits.

In addition to the pedagogical advantages, the study reveals that there are common themes that are used to develop AR in EFL education: the comparison of AR-enhanced with traditional methods, the incorporation of AR into the curriculum and teacher education, and the affective and experiential impact of AR on learning. All these themes interrelate in the necessity of a comprehensive system of integration of technological innovation, pedagogical design, and psychological preparedness. Although the results validate the potential of AR, the issue of insufficient teacher training, infrastructural limitations, and the novelty effect should be resolved to make the integration sustainable. In general, AR is a promising pedagogical innovation that can comply with the learning goals of the

21st century and the principles of constructivism. It relies on constant research, support of the policies, and creation of context-specific pedagogical frameworks that can help educators to make the most out of AR in helping establish the most meaningful and effective English language learning experiences.

8. Acknowledgment

The authors would like to acknowledge financial support from Smartclass Solution Sdn. Bhd. and Universiti Teknologi Malaysia under Contract Grant (R.J130000.7634.4C973).

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