Studies in Language, Education, and Culture (SeLEC) E-ISSN: 3109-3760
Vol. 2 No. 1 (May, 2026), pp. 67-80
https://doi.org/10.56303/selec.v2i1.1437

Augmented Reality in English Language Learning: Now and Then

Dewi Sari Wahyuni[1]✉, T. Sy Eiva Fatdha[1]
[1]*Informatics Engineering, Universitas Sains dan Teknologi Indonesia, Riau, Indonesia*
✉ email: dewisariwahyunu@usti.ac.id

Received:
April 29, 2026
Revised:
May 11, 2026
Accepted:
May 21, 2026
Published:
May 27, 2026

ABSTRACT

Augmented Reality (AR) has shifted from being a novelty technology in English Language Learning to an established pedagogical insfrastructure in fewer than two decades. This position paper argues that the field is now entering a third generation in which AR's value is no longer derived from the technology itself but from its integration with artificial intelligence, mobile ubiquity, and learner-centered task design. The argument is supported by a structured narrative review combined with a Scopus bibliometric mapping of 401 documents published between 2007 and 2026, retrieved using an explicit query combining augmented-reality and English-language-learning terms. The corpus is segmented into three analytical generations and visualized across four five-year periods, with two thirds of all indexed publications appearing in the most recent window (2022–2026). Synthesizing meta-analytic evidence with the field's most-cited and most-recent studies, the findings indicate that AR produces moderate-to-large positive effects on linguistic and affective outcomes, but that these effects are uneven across skills, age groups, and instructional contexts. The paper takes the position that further research should move beyond demonstrating that AR works, and instead address how AR-enhanced English instruction should be designed, governed, and integrated with generative AI in ways that protect equity, teacher agency, and pedagogical coherence. Concrete implications are offered for curriculum designers, teacher educators, and policymakers in English as a Foreign Language (EFL) contexts, with particular attention to low-resource settings such as Indonesia, where mobile-first AR deployment offers a credible pathway to scale immersive English instruction.

Keywords: *augmented reality; bibliometric review; EFL learning; immersive learning; language pedagogy*

INTRODUCTION

In 2007, Liu, Tan, and Chu published what is generally accepted as the first systematic attempt to use Augmented Reality (AR) in English-language learning:

a handheld system that used 2D barcodes, allowing elementary learners to scan printed cards and trigger pronunciation models on a personal digital assistant. At the time, the work was an isolated technical demonstration. Today, fewer than 20 years later, AR for English-language learning has matured into a global research enterprise with hundreds of empirical studies, multiple meta-analyses, and a rapidly expanding ecosystem of mobile applications, wearable headsets, and AI-driven tutoring agents. This trajectory raises a question that the field has not yet adequately addressed: what kind of pedagogical object has AR actually become, and what should the next generation of AR-supported English instruction look like?

Two recent meta-analyses converge on the conclusion that AR generally improves linguistic and affective outcomes in English language learning, although they disagree on the magnitude. Yang and Zhang (2024), drawing on 22 EFL studies, reported a moderate overall effect ($g = 0.63$) on language gains. Wu, Jiang, and Chen (2024), aggregating 35 studies and 2,171 participants, reported substantially larger pooled effects on both linguistic ($g = 0.734$) and affective ($g = 0.692$) outcomes. The gap between these estimates is itself instructive: it tracks differences in inclusion criteria, study quality thresholds, and the proportion of young-learner vocabulary studies in each sample, and it signals that "does AR work?" is no longer the most informative question. Both reviews flag the same persistent moderators: educational level, target language proficiency, and instructional design. They point to design and context as the new frontier. The harder questions of pedagogical design, teacher integration, and equitable access remain underexplored.

The problem this position paper addresses is not whether AR is effective for English language learning, but whether the dominant research agenda is still asking the most useful questions. A growing body of recent work, particularly publications from 2022 onward, signals a shift toward AR systems that are no longer solely about visual overlays but about multimodal, AI-mediated, and context-aware learning experiences. Examples include AR speaking systems with embedded speech recognition (Khodabandeh, 2025), AR pedagogical agent integrations for vocabulary acquisition (Chen et al., 2025), location-based AR for English-language tourism (Hsu, Barrett, & Liu, 2025), and AR-enhanced reading comprehension environments (Asadi & Ebadi, 2025). Despite this rapid evolution, a stable conceptual framework for thinking about how the technology has changed, and what those changes should mean for English language pedagogy, has not yet emerged.

The purpose of this paper is therefore twofold. First, it offers a periodized account of AR-supported English language learning, distinguishing a

foundational generation, a mainstreaming generation, and a current convergent generation, and showing how each generation has reframed the role of AR in language pedagogy. Second, it advances a position on what should come next: future AR research and development in English language learning should reorient from device-centric efficacy testing toward design-centric and equity-centric inquiry, particularly in low-resource and EFL contexts. The resulting implications operate at three levels. Theoretically, they call for tighter integration of AR research with established second-language acquisition frameworks. Practically, they offer guidance to curriculum designers and teacher educators. At the policy level, they address how ministries of education should approach AR procurement and teacher preparation. The paper closes with a research agenda framed around four questions that the field must address if AR is to be more than a temporarily fashionable add-on to English instruction.

METHOD

As a position paper, this study combines a structured narrative review with a focused bibliometric mapping. The aim is not to produce an exhaustive systematic review or a formal meta-analysis, both of which already exist in this domain, but to support an argument about the field's trajectory with empirical evidence drawn from the indexed literature. The narrative review draws on seminal and high-impact studies that have shaped the conceptual development of AR in English language learning, while the bibliometric mapping characterizes the field's volume, distribution, and dominant document types.

The bibliometric component is based on a Scopus search executed on May 18, 2026. The query targeted titles, abstracts, and author keywords using the following Boolean string: TITLE-ABS-KEY ((“augmented reality” OR “AR” OR “mixed reality”) AND (“English language learning” OR “EFL” OR “ESL” OR “English as a foreign language” OR “English as a second language” OR “language learning”)). Document types were restricted to articles, conference papers, reviews, conference reviews, book chapters, books, and short surveys, with publication years bounded between 2007, when the first peer-reviewed AR-for-English system appeared, and 2026, the year of the search. No language filter was applied at retrieval; non-English entries were screened at the title-abstract level and retained only when an English abstract clearly demonstrated relevance to English language learning. After deduplication and removal of one erratum, 401 documents were retained for analysis. Of these, 190 (47.4 percent) were journal articles, 118 (29.4 percent) were conference papers, 36 (9.0 percent) were full

reviews, 26 (6.5 percent) were conference reviews, 26 (6.5 percent) were book chapters, and the remainder were books and short surveys.

Two analytical procedures were then layered on this corpus. First, to make the temporal pattern legible, publications were grouped into four equal five-year windows (2007–2011, 2012–2016, 2017–2021, 2022–2026). Second, to identify thematic clusters, titles, abstracts, and author keywords were inductively examined by both authors for recurring constructs. An initial open-coding pass yielded a long list of candidate themes, which were then consolidated through discussion into five high-frequency clusters: motivation and engagement, vocabulary acquisition, speaking and listening, young learners, and the integration of artificial intelligence. Inter-rater agreement on the final cluster assignment for a 10 percent random sub-sample was 91 percent, with disagreements resolved by re-reading the abstract together.

The three analytical generations advanced in this paper are foundational, mainstreaming, and convergent. They were derived deductively from the corpus rather than imposed a priori. Three criteria, applied jointly, distinguish them: (i) the dominant interaction paradigm reported in published systems (marker-based and tethered devices in the foundational period; marker-less mobile AR after the 2017 release of ARCore and ARKit; multimodal and AI-mediated AR from 2022 onward); (ii) the dominant pedagogical anchoring (technology demonstration in the foundational generation; explicit grounding in second language acquisition theory in the mainstreaming generation; convergence with artificial intelligence and equity-oriented framings in the convergent generation); and (iii) the dominant publication type (conference papers in the foundational generation; journal articles in the mainstreaming generation; journal articles and systematic reviews in the convergent generation). Because the foundational generation spans an entire decade with comparatively few publications, Table 1 subdivides it into a 2007–2011 prototyping window and a 2012–2016 expansion window for descriptive granularity. The narrative review then triangulated these patterns with the most-cited and most-recent studies in the corpus, supplemented by additional sources retrieved from related meta-analyses and theoretical literature outside the Scopus query window.

The position taken in the discussion is supported by three forms of evidence: the temporal distribution of the corpus, which signals where research effort has accumulated; the citation structure of the corpus, which signals which studies have most shaped current thinking; and the thematic content of recent publications, which signals where the field appears to be heading. This methodological approach is appropriate for a position paper because it

foregrounds argumentation while disciplining that argumentation with verifiable empirical patterns. The limitations of the approach, including the single-database scope and the absence of formal effect-size pooling, are acknowledged in the conclusion.

FINDINGS AND DISCUSSION

The bibliometric mapping reveals a field whose volume has grown by roughly an order of magnitude in the last decade. Table 1 presents the distribution of indexed publications across four periods. Only five documents (1.3 percent) appeared in the foundational five years from 2007 to 2011, while 269 (67.6 percent) appeared in the most recent five-year window from 2022 to 2026. This rapid acceleration is not incidental; it reflects the convergence of three external developments: the spread of mobile-grade AR through ARCore and ARKit from 2017 onward, the expansion of EFL research capacity in East and Southeast Asia, and, most recently, the public release of generative AI systems that have reshaped expectations of what AR can do.

Table 1. Distribution of AR-related English language learning publications indexed in Scopus, by five-year period (n = 401)

Period	n	% of corpus	Dominant document type
2007-2011 (Foundational)	5	1.2	Conference papers
2012-2016 (Prototyping)	31	7.7	Conference papers and journal articles
2017-2021 (Mainstreaming)	93	23.2	Journal articles
2022-2026 Convergent	272	67.8	Journal articles and reviews

*Source: Authors' analysis of Scopus export, May 18, 2026

The Then: Foundations and Marker-Based Prototypes (2007-2016)

The earliest AR systems for English language learning were marker-based, mobile-tethered, and pedagogically narrow. Liu, Tan, and Chu (2007) introduced a 2D barcode handheld learning system that triggered audiovisual English content on physical cards. The same group later refined this architecture in a context-aware ubiquitous learning environment (Liu, 2009) and a QR-code-supported mobile English learning system (Liu, Tan, & Chu,

2010). Liu's 2009 paper, with 231 citations as of May 2026, remains one of the most-cited works in the field and effectively defined what AR for language learning meant during this period: digital media triggered by physical objects, intended to enrich vocabulary practice in primary school classrooms.

Through the early 2010s, this paradigm expanded modestly. Barreira et al. (2012) introduced a marker-based AR game called MOW for multilingual word learning, and Yang and Liao (2014) developed an online AR environment for culture and language learning that uses freehand gestures. Solak and Cakir (2015) provided one of the first quasi-experimental confirmations that AR-designed materials improved vocabulary outcomes for university-level Turkish EFL learners. Two characteristics define this foundational period. First, the studies were technology-led: they tended to describe a system and demonstrate that learners could use it, often with small samples and short interventions. Second, the pedagogical scope was narrow, with vocabulary acquisition for young or beginning learners receiving disproportionate attention. The conceptual influence of Milgram, Takemura, Utsumi, and Kishino's (1994) reality-virtuality continuum was evident primarily as a definitional reference rather than as a generative theoretical framework.

The Pivot: Mainstreaming and Theoretical Anchoring (2017-2021)

The mainstreaming period was triggered by two simultaneous shifts: the emergence of smartphones with sufficient processing power for markerless AR and the public release of developer-friendly AR platforms in 2017. The bibliometric record reflects this clearly, with publications quadrupling from 31 in the 2012–2016 period to 93 in the 2017–2021 period. The single most-cited paper in the entire corpus, Hsu's (2017) study published in Computers and Education and cited 259 times, signals the analytical shift of this generation. Rather than asking whether AR works, Hsu asked for whom and under what learning style profile AR works best, and reported significant differences in outcomes across learner profiles. This represented a move from technology demonstration toward pedagogically calibrated investigation.

Several other influential studies in this period reinforced the same shift. Redondo et al. (2020) examined AR in early childhood EFL and reported significant improvements in motivation and vocabulary, while Che Dalim et al. (2020) integrated speech input into an AR system for non-native children, thereby opening the door to multimodal interaction. Lee and Park (2020) reconceptualized the role of context by deploying a location-based AR application explicitly grounded in situated learning theory, and Chen (2020) showed that AR videos could serve as scaffolding for both achievement and motivation. Earlier in the window, Taskiran (2019) added affective evidence on

AR games and EFL motivation, and Ho et al. (2017) demonstrated context-aware AR support for listening and speaking in real-life situations.

Taken together, these studies anchored AR research in established second-language acquisition theory: input enhancement, situated cognition, and multimedia learning, and stabilized AR-supported English language learning as a recognizable subfield within Computer-Assisted Language Learning, with its own conceptual vocabulary and a small canon of reference studies. The most notable internal tension of this period was already visible, however: theoretical anchoring rarely extended to the design level. Most studies cited a single SLA framework in the literature review but reported task designs that could just as easily have been justified by several alternative frameworks, suggesting that theoretical grounding was used to legitimize AR rather than to constrain its design. Luo, Zou, and Kohnke's (2024) subsequent systematic review of xReality in the English classroom confirms this pattern across the broader CALL literature.

The Now: Convergence with Artificial Intelligence (2022-2026)

If the previous period was about mainstreaming, the current period is about convergence. Two-thirds of the entire indexed corpus has appeared in the last five years, and the dominant document type has shifted to journal articles and full systematic reviews. Substantively, three developments distinguish this period from what came before. First, AR is no longer studied in isolation. Recent work increasingly positions AR as one component within an integrated immersive technology stack that includes virtual reality, mixed reality, and, crucially, generative AI. Zhang and Miao (2025) examined how immersive technologies combined with AI shape EFL engagement and motivation, and, by an author keyword analysis of the corpus, a substantial share of recent publications jointly invoke artificial intelligence and AR.

Second, the pedagogical scope has widened well beyond vocabulary. Recent work has shown AR gains across the four core skills: speaking accuracy and willingness to communicate (Khodabandeh, 2025), reading comprehension (Asadi & Ebadi, 2025; Shaaban & Mohamed, 2024), writing through ubiquitous AR applications (Lin, Liu, & Chen, 2022), and listening within context-aware tourism scenarios (Hsu, Barrett, & Liu, 2025). Domain-specific deployments such as Giofré's (2026) AR application for English for Specific Purposes and Chen and Lai's (2026) AI-enhanced AR for L2 medical English mark a clear shift from generic English instruction toward targeted professional and academic varieties.

Third, equity and inclusion have entered the agenda. González-Afonso et al. (2026) explicitly framed AR and VR as accessibility strategies for deaf and

hard-of-hearing learners, and Oto-Millera, Pellicer-Ortín, and Bustamante (2025) systematically reviewed AR for gifted English learners. These framings remain numerically marginal in the corpus: less than 5 percent of indexed publications between 2022 and 2026 foreground accessibility or underserved populations, but they signal a normative shift absent from earlier generations of AR-for-English research.

The convergence with AI deserves particular attention. Alshumaimeri and Alshememry (2024) mapped the extent of AI applications in EFL teaching, and recent designs increasingly couple AR's spatial-visual affordances with the conversational and adaptive affordances of large language models. The pedagogical promise is significant: an AR overlay can anchor a learner's attention to a real-world referent while an AI agent provides adaptive feedback, scaffolding, and dialogue. Chen and Lai (2026), Chen et al. (2025), and Zhang and Miao (2025) all report task designs in which the AI component handles most of the linguistic interaction, while the AR component primarily contextualizes it.

The risks attached to this division of labor are equally significant: dependence on commercial cloud infrastructure, opaque assessment, hallucinated linguistic input, and uneven access in low-resource contexts. Crucially, none of the AI-AR studies surveyed reports systematic checks for hallucinated target-language input, and none reports validity evidence for AI-generated feedback against expert human ratings. The empirical literature has not yet kept pace with the design choices it makes, thereby making the gap between technological capability and pedagogical accountability one of the defining problems of the current generation.

Persistent Themes and Tensions Across Periods

Despite the visible periodization, several themes persist throughout the field's history. Motivation and engagement remain the most frequently invoked outcome variables; a topical scan of the corpus shows that more than one in three studies foregrounds affective constructs, a pattern that aligns with the meta-analytic finding by Wu et al. (2024) of strong affective gains. Vocabulary remains the most frequently targeted linguistic outcome, despite repeated calls in the literature to move toward higher-order skills. Young learners, particularly primary and preschool children, remain the dominant population, with relatively less work on adolescents, adult learners, and learners with disabilities.

These persistent themes are accompanied by three persistent tensions. The first is the gap between technical sophistication and pedagogical depth: the most technically novel systems are not necessarily those grounded in the most defensible second-language acquisition theory, and Luo, Zou, and Kohnke (2024) document the same pattern across xReality more broadly. The second is

the gap between research contexts and deployment contexts. A substantial share of empirical work is conducted in well-resourced classrooms, while the populations most likely to benefit from low-cost AR, learners in EFL contexts in Indonesia, the Middle East, and parts of sub-Saharan Africa, are underrepresented in the high-impact literature. Recent Indonesian needs analyses (Yulianawati et al., 2025) and multilevel work on Indonesian primary learners (Retnowati et al., 2026) begin to address this asymmetry but remain rare in the citation core of the field.

The third tension is the teacher gap. Very few studies in the corpus treat the teacher as a primary unit of analysis, even though AR adoption ultimately depends on teacher confidence, training, and curricular fit. Teo, Khazaie, and Derakhshan's (2022) study of teacher immediacy in AR-assisted flipped classrooms is one of the few high-impact exceptions; Salehi's (2025) qualitative work with junior-high English teachers and Punar Özçelik, Yangin Ekşi, and Kic-Drgas's (2025) cross-cultural study with pre-service EFL teachers begin to fill this gap. Read together, these three tensions identify a shared methodological limitation across the reviewed AR literature: short interventions, single-classroom samples, and outcome batteries dominated by motivation and vocabulary, with limited attention to durability, transfer, or institutional sustainability.

Position: From Efficacy to Design and Equity

This paper argues that the field has reached a turning point at which the dominant research question must change. After two decades of accumulated evidence, including converging meta-analytic estimates from Yang and Zhang (2024) and Wu et al. (2024), the question of whether AR improves English language learning outcomes is essentially settled at the population level. What remains underdetermined is how AR-enhanced English instruction should be designed for specific learner populations and specific institutional contexts, how AR should be governed in an era of increasingly capable generative AI, and how access to AR-supported English learning should be made equitable across the global EFL landscape.

Three commitments follow from this position. First, future research should privilege design-based studies that articulate testable principles for AR task design, rather than further single-shot efficacy comparisons. Second, the integration of AR with generative AI should be treated as a substantive pedagogical question rather than a technical inevitability; questions about teacher mediation, hallucination risk, and assessment validity must be addressed in parallel with deployment. Third, the field should consciously redirect attention toward low-resource EFL contexts, where mobile-first AR

offers a credible pathway to scale research infrastructure, teacher preparation, and content localization, yet they are systematically weaker. For Indonesia and comparable settings, four concrete moves would translate this commitment into practice: (i) prioritizing marker-based or image-based AR over headset-dependent designs so that existing student smartphones become the delivery platform; (ii) embedding AR micro-tasks (five to seven minutes) into existing curriculum units rather than as standalone interventions, so that integration does not require new timetabling; (iii) building short, locally relevant AR content libraries co-authored with in-service teachers, addressing both the teacher-agency gap and the localization gap simultaneously; and (iv) negotiating offline-first or low-bandwidth modes for any AI-enhanced AR deployment, to avoid making access dependent on commercial cloud quality of service. Each of these moves is feasible with current infrastructure and turns the equity argument from a normative claim into an implementation agenda.

CONCLUSION

Augmented Reality has moved from a peripheral curiosity in 2007 to a maturing infrastructure for English-language learning in 2026, with most of the empirical evidence base generated in the last five years. The trajectory traced in this paper, from foundational marker-based prototypes through a mainstreaming generation that anchored AR in second language acquisition theory to a current convergent generation that fuses AR with generative AI, indicates that AR has become a genuine pedagogical object rather than a transient technological enthusiasm. The position advanced here is that the next decade of work should shift from demonstrating that AR is effective for English learning to defining how AR-enhanced English instruction should be designed, integrated with AI, and equitably made available. This is a different agenda from the one that produced the field's existing canon, and it requires different methodological commitments, including more design-based research, more longitudinal evidence, more attention to teachers and to underserved EFL learners, and more critical engagement with the commercial and governance arrangements that increasingly shape what AR-supported English learning can and cannot do. The contribution of this paper is to make that pivot visible and to offer a periodization that the field can use to organize the work that comes next.

ACKNOWLEDGMENTS

The authors thank the Institute for Research and Community Service, Universitas Sains dan Teknologi Indonesia, for institutional support and the editorial team of Studies in Language, Education, and Culture for constructive feedback during the revision process. No external funding was received for this research.

REFERENCES

Alshumaimeri, Y. A., & Alshememry, A. K. (2024). The extent of AI applications in EFL learning and teaching. IEEE Transactions on Learning Technologies, 17, 1160–1173. https://doi.org/10.1109/TLT.2023.3322128

Asadi, M., & Ebadi, S. (2025). Integrating augmented reality in EFL reading comprehension: A mixed-methods study. Research and Practice in Technology Enhanced Learning, 20, 23. https://doi.org/10.58459/rptel.2025.20023

Barreira, J., Bessa, M., Pereira, L. C., Adão, T., Peres, E., & Magalhães, L. (2012). MOW: Augmented reality game to learn words in different languages. In 2012 7th Iberian Conference on Information Systems and Technologies (CISTI) (pp. 1–6). IEEE.

Che Dalim, C. S., Sunar, M. S., Dey, A., & Billinghurst, M. (2020). Using augmented reality with speech input for non-native children's language learning. International Journal of Human-Computer Studies, 134, 44–64. https://doi.org/10.1016/j.ijhcs.2019.10.002

Chen, C., Jamiat, N., Rabu, S. N. A., & Du, S. (2025). Effects of augmented reality with pedagogical agent on EFL primary students' vocabulary acquisition, motivation and engagement. International Journal of Human-Computer Interaction. https://doi.org/10.1080/10447318.2024.2443534

Chen, C.-H. (2020). AR videos as scaffolding to foster students' learning achievements and motivation in EFL learning. British Journal of Educational Technology, 51(3), 657–672. https://doi.org/10.1111/bjet.12902

Chen, Y., & Lai, C. (2026). AI-enhanced augmented reality for L2 medical English learning and remote surgical collaboration. In Lecture Notes in Computer Science. Springer. https://doi.org/10.1007/978-3-031-98185-2_6

Giofré, V. (2026). Designing material for ESP-XR: An augmented reality-based mobile application for English for specific purposes. International Journal of Language Studies, 20(1), 1–24. https://doi.org/10.5281/zenodo.18409171

González-Afonso, M. C., Perdomo-López, C. D. L. Á., & Plasencia, J. (2026). Inclusive education beyond formal settings: AR and VR as accessibility

strategies for deaf and hard-of-hearing learners. Frontiers in Education, 11. https://doi.org/10.3389/feduc.2025.1715885

Ho, S.-C., Hsieh, S.-W., Sun, P.-C., & Chen, C.-M. (2017). To activate English learning: Listen and speak in real life context with an AR featured u-learning system. Educational Technology and Society, 20(2), 176–187.

Hsu, K.-C., Barrett, N. E., & Liu, G.-Z. (2025). English for tourism and AR-assisted context-aware ubiquitous learning: A preliminary design-based research. Computer Assisted Language Learning, 38(3), 521–549. https://doi.org/10.1080/09588221.2023.2202701

Hsu, T.-C. (2017). Learning English with augmented reality: Do learning styles matter? Computers and Education, 106, 137–149. https://doi.org/10.1016/j.compedu.2016.12.007

Khodabandeh, F. (2025). Investigating the effectiveness of augmented reality-enhanced instruction on EFL learners' speaking accuracy and willingness to communicate. Language Teaching Research. https://doi.org/10.1177/13621688221110991

Lee, S.-M., & Park, M. (2020). Reconceptualization of the context in language learning with a location-based AR app. Computer Assisted Language Learning, 33(8), 936–959. https://doi.org/10.1080/09588221.2019.1602545

Lin, V., Liu, G.-Z., & Chen, N.-S. (2022). The effects of an augmented-reality ubiquitous writing application: A comparative pilot project. Computer Assisted Language Learning, 35(5–6), 989–1030. https://doi.org/10.1080/09588221.2020.1770291

Liu, T.-Y. (2009). A context-aware ubiquitous learning environment for language listening and speaking. Journal of Computer Assisted Learning, 25(6), 515–527. https://doi.org/10.1111/j.1365-2729.2009.00329.x

Liu, T.-Y., Tan, T.-H., & Chu, Y.-L. (2007). 2D barcode and augmented reality supported English learning system. In Proceedings — 6th IEEE/ACIS International Conference on Computer and Information Science (pp. 5–10). IEEE. https://doi.org/10.1109/ICIS.2007.79

Liu, T.-Y., Tan, T.-H., & Chu, Y.-L. (2010). QR code and augmented reality-supported mobile English learning system. In Lecture Notes in Computer Science (Vol. 5960, pp. 37–52). Springer. https://doi.org/10.1007/978-3-642-12349-8_3

Luo, S., Zou, D., & Kohnke, L. (2024). A systematic review of research on xReality (XR) in the English classroom: Trends, research areas, benefits, and challenges. Computers and Education: X Reality, 4, 100049. https://doi.org/10.1016/j.cexr.2023.100049

Milgram, P., Takemura, H., Utsumi, A., & Kishino, F. (1994). Augmented reality: A class of displays on the reality-virtuality continuum. In Telemanipulator and Telepresence Technologies (Vol. 2351, pp. 282–292). SPIE. https://doi.org/10.1117/12.197321

Oto-Millera, N., Pellicer-Ortín, S., & Bustamante, J. C. (2025). Augmented reality in English language acquisition among gifted learners: A systematic scoping review (2020–2025). Applied Sciences, 15(21), 11487. https://doi.org/10.3390/app152111487

Punar Özçelik, N., Yangin Ekşi, G., & Kic-Drgas, J. (2025). A cross-cultural study of the usability of AR technology: Insights of pre-service EFL teachers from Poland and Türkiye. Innovation in Language Learning and Teaching. https://doi.org/10.1080/17501229.2025.2585680

Redondo, B., Cózar-Gutiérrez, R., González-Calero, J. A., & Sánchez Ruiz, R. (2020). Integration of augmented reality in the teaching of English as a foreign language in early childhood. Early Childhood Education Journal, 48(2), 147–155. https://doi.org/10.1007/s10643-019-00999-5

Retnowati, N., Safitri, A., Fatonah, U., Septian, K. Y., & Endri, E. (2026). English learning experiences of Indonesian primary school students: Multilevel perspectives across classroom, digital, and community contexts. International Journal of English Language and Literature Studies, 15(2), 74–85. https://doi.org/10.55493/5019.v15i2.5921

Salehi, N. (2025). Teaching vocabulary with augmented reality: Voices from junior high school English teachers. Discover Education, 4(1), 230. https://doi.org/10.1007/s44217-025-00673-6

Shaaban, T. S., & Mohamed, A. M. (2024). Exploring the effectiveness of augmented reality technology on reading comprehension skills among early childhood pupils with learning disabilities. Journal of Computers in Education, 11(2), 423–444. https://doi.org/10.1007/s40692-023-00269-9

Solak, E., & Cakir, R. (2015). Exploring the effect of materials designed with augmented reality on language learners' vocabulary learning. Journal of Educators Online, 12(2), 50–72. https://doi.org/10.9743/JEO.2015.2.5

Taskiran, A. (2019). The effect of augmented reality games on English as foreign language motivation. E-Learning and Digital Media, 16(2), 122–135. https://doi.org/10.1177/2042753018817541

Teo, T., Khazaie, S., & Derakhshan, A. (2022). Exploring teacher immediacy-(non)dependency in the tutored augmented reality game-assisted flipped classrooms. Computers and Education, 179, 104406. https://doi.org/10.1016/j.compedu.2021.104406

Wu, J., Jiang, H., & Chen, S. (2024). Augmented reality technology in language learning: A meta-analysis. Language Learning and Technology, 28(2), 1–29.

Yang, M.-T., & Liao, W.-C. (2014). Computer-assisted culture learning in an online augmented reality environment based on free-hand gesture interaction. IEEE Transactions on Learning Technologies, 7(2), 107–117. https://doi.org/10.1109/TLT.2014.2307297

Yang, P., & Zhang, W. (2024). Effectiveness of augmented reality on EFL learners' language gains: A meta-analysis. Innovation in Language Learning and Teaching, 19(1), 48–63. https://doi.org/10.1080/17501229.2024.2323529

Yulianawati, I., Lestari, Z. W., Anggrarini, N., & Syafryadin. (2025). Needs analysis for developing augmented reality-based critical reading materials for EFL students. Studies in English Language and Education, 12(3), 1346–1361. https://doi.org/10.24815/siele.v12i3.43391

Zhang, Y., & Miao, Z. (2025). Enhancing EFL learners' engagement and motivation through immersive technologies: The role of artificial intelligence. European Journal of Education, 60(2), e70128. https://doi.org/10.1111/ejed.70128