# Augmented Reality in ELT Materials to Enhance Learner Engagement: Current Trends and Challenges

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**Abstract.** The development of English Language Teaching (ELT) materials has undergone significant transformation over the past three centuries. A paradigm shift has occurred in the way these materials are created. In the 19th century, textbooks primarily focused on grammar rules, vocabulary lists, and direct translation exercises. Over time, materials evolved to include simple dialogues and illustrations depicting real-life situations, followed by scripted dialogues, audio recordings, and pattern drills. Later, the incorporation of authentic texts, role-plays, and situational activities further enriched ELT resources. More recently, the emergence of Open Educational Resources (OERs), gamified learning apps, and, currently, AI, Augmented Reality (AR), and personalized learning tools has further reshaped the ELT materials. These developments continue to transform how language is taught and learned. The present research focuses on the 21st century material development in ELT using Augmented Reality (AR). The study explored the latest developments in adopting and designing AR materials for immersive and virtual learning experience. It concentrated on the progressive role of some developing and developed nations like the USA, Australia, and the UK in adapting AR in the educational field. It discussed leading AR tools that enhance listening, speaking, reading, writing, grammar, vocabulary, and pronunciation skills. The study also focused on the prospects and challenges in India to the changing scenarios and integration of AR in the language classroom. The findings revealed a positive inclination towards AR-generated content for improving English language skills. India has the potential to be one of the leading nations to embrace AR for designing ELT materials.

**Keywords:** ELT Materials, Augmented Reality (AR), Language development, Revenue Generation, Indian context, Prospects, Challenges.

## 1. INTRODUCTION

Augmented Reality (AR) focuses on the integration of text, 3D graphics, video, and audio simultaneously to create a virtual and immersive experience for learners. AR model has been progressive due to the availability of cutting-edge technology. It is an emerging innovative tool successfully implemented in medicine, military, manufacturing, marketing and entertainment, and education (Mekni and Lemieux, 2014). New orientations in AR for designing English Language Teaching (ELT) materials demonstrate the effective use of innovative technologies to improve the quality of learning content. AR can generate contextual material through a learning-centered approach. The availability of cell phones, desktops, and tablets provides hardware specifications to generate ELT materials and resources in fun and educative ways.

## 2. LITERATURE REVIEW

Zhang, Zou, and Cheng (2024) examined the role of Mixed Reality (MR) in language learning in the research article "Mixed Reality's Impact: The Cultural Intersection of Language Learning." The study revealed that MR designs allow real-time, interactive, and immersive language resources. The study incorporated a theoretical framework based on cognitive multimedia learning, game-based learning, sociocultural theory, and constructivism. The virtual environment provides access to interactive lessons, learner autonomy, and collaborative and cooperative learning for improving language proficiency in a fun-filled environment. It identifies the learning risks in a protected and realistic learning environment. (Zhang, Zou, and Cheng, 2024)

Parmaxi and Demetriou's study (2020) on "Augmented Reality in Language Learning: A State-of-the-Art Review of 2014–2019" stated that AR provides a comprehensive analysis of research on the use of Augmented Reality (AR) in language learning. The findings revealed that most of the AR applications vested in vocabulary acquisition (23.9% of the studies), reading (12.7%), speaking (9.9%), writing (8.5%), and general language skills (9.9%). The study also revealed that several AR applications were available on smartphones and tablets, thus providing access to design enriching, engaging, and contextually relevant materials to enable learning experiences. The 21st-century skills among students to meet the KSAVE framework (Knowledge, Skills, Attitudes, Values, and Ethics) are possible through AR features. The tools encompass cooperative, student-oriented, and interactive learning consistent with recommended best practices. The study revealed that there was no prior research with learners incorporating established language learning theories to understand the development and assessment process of AR tools. The modularity of AR applications and their integration into different contexts of education was still a concern, and only a few applications have been developed to support the use of application platforms in educational fields. The study suggested that attention should be paid to interface experiences and reliable methods of comprehension. (AntigoniParmaxi and Alan A. Demetriou, 2020).

Akçayır and Akçayır's article (2017) "Advantages and challenges associated with augmented reality for education: A systematic review of the literature" provides a comprehensive review of Augmented Reality (AR) in education. The study revealed that an interactive learning environment through 3D models and simulation

improves knowledge, retention, and comprehension levels. Such opportunities make the learners visualize the content and memorize it, resulting in enhanced engagement and motivation. However, some of the challenges included compatibility of hardware with software devices, expensive AR tools, and inadequately equipped educators with no proper training. The Cognitive overload with many AR features or information overload might be detrimental to learning. The study suggested creating guiding principles for the design of educational content with the use of Augmented Reality. (Akçayır and Akçayır, 2017)

Yang et al.'s study (2019) explored the impact of Augmented Reality (AR)-based learning activities on students' comprehension and communicative abilities in English classes. The study revealed that the learners in the AR environment could comprehend and communicate well. There was an impact on their engagement and motivational levels through immersive learning experiences promoting group activities and collaborative learning. The study suggested a gap between language concept and language practice, which needs a focused study to understand the suitable language learning environment. (Yang et al., 2019)

## 3. AR IN ELT Materials

Augmented Reality (AR) effectively integrates into language education. There are many AR applications that provide immense support systems to learners for enhancing LSRW skills, grammar, and vocabulary development.

### 3.1. Listening Skills

- Lyrics Training allows to learn a language while listening to songs. It enhances vocabulary, grammar, and conversational ability. It allows the learners to perceive the sounds and words of a foreign language in the shortest time. The application navigates the learners with contextual input to listen to different accents and pronunciations, a unique feature of this AR. The learners develop the ability and flexibility to comprehend accents of languages and improve their listening comprehension.

- Listen Notes Podcast search engine has the largest library of podcasts in different categories. Learners can listen to accents and topics to improve their listening skills.

- Listen to Listening application creates lists of episodes. The playlists provide facilities for Really Simple Syndication (RSS) feeds that enable them to integrate into any set of podcast player applications. Currently, there are more than 3.3 million podcasts and 200 million episodes. Seattle-based Internet Movie Database (IMDb) has more than 8.7 million titles in its database, consisting of movies, TV shows, and episodes. Spotify has over 8.2 million tracks and Audible has over 470,000 audio books.

- Listen411 is helpful for transcribing podcasts. The tool takes a minute to transcribe a one-hour audio file.

- Rosetta Stone follows the school standards of the American Council on the Teaching of Foreign Languages (ACTFL), College and Career Readiness (CASAS CCR) Standards, Teaching English to Speakers of Other Languages (TESOL), National Curriculum for England, and Common European Framework of Reference (CEFR). The language learning application applies and integrates AR to make lessons interactive. The application provides a free listening practice section with contextual situations.

The learners can access courses in 24 languages and progress from the basic to the advanced level. Employees with little time can take online or app-based language training and exercise their speaking skills in front of a tutor anytime. Every lesson in the curriculum will enhance students' proficiency and cover listening, speaking pronunciation, reading, writing, grammar and vocabulary, and review skills. The learning materials start from one word to phrase, and then to sentences and dialogues based on the learning abilities. The learners understand through context and reasoning. This enables them to establish a much more long-lasting relationship with the language. The learners can conveniently log into Rosetta Stone using Clever, Canvas, Blackboard, Class Link, and Moodle with a personalized feedback system.

### 3.2. Speaking Skills

- Mondly AR provides English conversations suitable for beginners to intermediate-level learners. It offers English conversations using AR avatars in real-life situations. The learners engage in contextually rich content with an immersive and multilingual interface. For example: when going to a restaurant to order food or asking for directions - the avatars interact with the learners directly. The application gives real-time feedback and comments on pronunciation and sentence patterns.

- Fluent Worlds utilizes augmented reality and 3D gaming to enhance speaking and listening skills. The learners move through geographic spaces such as an airport or a hotel and interact with AR avatars in animated conversations. It offers realistic conversational practice with exercises and a progress-tracking mechanism. The application supports different proficiency levels. The immersive and interactive modes represent the innovative teaching pedagogy, for a fun and transformative learning world.

- Google Lens is an application that builds creative English lessons using AR. The learner can practice speaking through descriptions and discussions. The application captures and scans texts, documents, and objects. It prompts the learner towards descriptive speaking. It improves word formation with the help of visual aids.

- EngVarta is best for relatively advanced English speakers who want to consolidate their skills through live interaction with instructors. It is useful for working professionals and students preparing for English

language examinations such as IELTS or TOEFL. FixoLang, a unique IELTS preparation tool provides scores, describes errors, and gives immediate feedback.

- Sounds, the pronunciation application that won the British Council's Innovation in Learner Resources Elton Award, 2012, supports mastering English pronunciation. The interactive phonemic chart categorizes and presents speech sounds into vowels, diphthongs, and consonants. The learner can record and practice Listening, Writing & Reading with instructional videos, high-frequency word lists, and quizzes. The record option provides
- Similarly, SmallTalk2Me and ELSA (English Language Speech Assistant) allow learners to practice pronunciation, and conversations and prepare for global competitive examinations.

### 3.3. Reading Skills

- AUGTHAT has many interactive activity sheets and a 360-degree virtual environment allows the learner to experience virtual learning instead of just reading the textbooks.
- Zoo Burst is a storytelling application that allows a learner to design a three-dimensional pop-up book. It teaches elementary-level students through visualization or image learning. It provides an opportunity to build storybooks with 3-D characters.
- Two Left Feet puts the book into real experience with the help of 3D AR technology, converting the characters in the book into fully animated 3D models.
- 3DBear allows the learners to tell a story, design a building using Augmented Reality, redesign concepts, or represent components of ecosystems. They can upload designs or import them to build an actual model with the best ideas.

### 3.4. Writing Skills

- Narrator AR is one of the highly engaging and beneficial augmented reality applications designed for educational purposes. This facilitates the development of writing skills in preschool children. Initially, the child writes with a pen, and subsequently, the application enables the transfer of their handwritten text into an animated augmented-reality format. This process fosters a robust visual connection as children interact with letters and numbers in three-dimensional animations. Furthermore, it supports critical developmental stages during early childhood, particularly benefiting learners with visual learning preferences.
- Quiver serves as a coloring and creative writing tool. It is particularly advantageous for young learners, allowing them to express their creative ideas through drawing. The augmented reality-enabled worksheets provide an interactive experience where colored images come to life, and serve as a source of inspiration for crafting descriptive and narrative stories.
- HP Reveal (formerly Aurasma) lets users generate fun and engaging AR applications. The educators and students can subsequently integrate diverse materials, including videos, images, or animations, into conventional text-based writing.
- Crayola Alive uses conventional coloring augmented by AR to bring characters and stories alive. Learners can compose a narrative using animated scenes.
- Story Fab enables learners to design an augmented storyboard. The writers can plan and perform their character, setting, and events while storytelling. CoSpaces Edu is an extended version of the application that helps learners write stories, scripts, and explanatory texts and practice the tasks.

### 3.5. Grammar and Vocabulary Improvement

- Learn English Grammar has tutorial activities and exercises on grammatical issues. It also incorporates texts, images, and audio tracks to enhance the learner's experience and gives immediate feedback.
- Talk Pal includes grammar practice in an interactive learning environment with feedback. The learners discover complex grammatical rules and structures.
- Aurasma enables the learners to see how the grammar rules look with the help of AR overlays.
- Elements 4D can be useful for learning grammar. The learner can design and create interactive lessons on grammar rules and structures.
- Word Lens is an application that applies augmented reality to translate languages immediately. It develops grammar by translating sentences and observing how grammar is used in another language.
- Vocabulary Builder AR by 360 Ed Tech uses AR and games for learning English vocabulary.
- Immerse helps children learn STEM subjects, enhanced by applications of augmented reality. It consists of animals, machines, and landscapes in 3D and is particularly useful for teaching science-related words.

### 4. INITIATIVES IN THE EDUCATION SECTOR

The integration of AR into English language education develops both teaching practices and learning outcomes. There are several projects which are integrating Augmented Reality (AR) into education, to support personalized learning and promote inclusive educational practices. Some of the initiatives:

## 4.1. The United States

The article by Utah College of Applied Technology (UCAT) discusses the fast-growing application of Augmented Reality (AR) in education in the United States. It identifies specific AR technologies currently applied to the learning context, especially STEM and language learning contexts to improve learners' learning environments, and describes possible benefits of AR technologies for an interactive learning environment.

The National Science Foundation (NSF), is a main source of sponsors funding various educational technology initiatives, including AR. The National Science Foundation's academic research responsibilities pertain to education initiatives that enhance learners' achievement with technology. The United States Department of Education has funded AR research projects via programs aimed at improving pedagogy, especially in STEM settings. The Department of Defense (DoD) supports AR research in military training and educational technologies. Some of the most popular and commonly used AR applications in schools include Learn English Grammar by British Council and Talk Pal. They make learning more engaging and enjoyable. These apps allow students to engage in grammar, vocabulary, and pronunciation at a more interactive level.

Many State-funded initiatives have adopted educational programs that focus on AR. For instance, California and New York have been pioneers in Edtech., especially powered by federal grants. Some examples of such start-ups are Cambly, Forage (Inside Sherpa), and Amira Learning. These firms provide unique products in language learning, reading development, and career progression. Research and Development and Teacher training programs concentrate on integrating AR tools into teaching practices and creating lesson plans. Currently, organizations such as Educators of America offer training to assist educators in using technology appropriately to meet the demands of 21st-century skills. A majority of US classrooms experience various types of AR technologies to enhance learning experiences, including 3D visualizations, interactive simulations, and immersive virtual environments.

AR applications including CoSpaces Edu and Merge Cube assist in developing virtual 3D learning and offer subjects like literature and history. This type of engagement will assist basic-level learners in comprehending and retaining English language concepts and responding to virtual objects and environments.

USA has been investing in K-12 Education, virtual field trips in ESL contexts, STEM, literacy, and more immersive learning experiences to expand student retention, engagement, motivation, and creativity.

## 4.2. Australia

Southgate et al. (2018) in a research report on Artificial intelligence and emerging technologies in schools, concluded that although there is a concern about the arrival of immersive learning, there are still studies about the consequences of IVR for learners and their learning space. There is a need for extensive large-scale longitudinal research on the implementation and learning potential of immersion and IVR-based instruction. The teachers need to be very careful, in applying the guidelines and ensure safe and ethical use of technology. The issues of privacy, copyright, and intellectual property rights within Virtual Reality content need proper attention. The report also stated that school systems should assist teachers in comprehending the privacy concerns of integrating immersive technologies for learners. A teacher has to ask some questions before bringing an augmented reality such as

- How is it different from other educational resources or tools?
- How is it unique from real-life learning experiences?
- How does it add value or create more exciting content than the existing material?
- Does learning space meet the required technical and internet network specifications?
- Are learners equipped with the necessary training to work on AR?
- Do the learners have an appropriate age to work with AR?
- Can the learners recognize the purpose of using AR?
- Are learners provided with a safer learning environment?
- Are the intellectual property, privacy, and copyright issues considered before using AR? (Southgate et al. 2018)

Research studies by the University of Newcastle Research focused on AR's support of experiential learning, visualization, and simplifying complex concepts. The document commissioned by the Australian Government Department of Education on Short Read on VR & AR by the Australian Government explores the use of VR and AR in schools. It also focuses on technological support for enhanced learner engagement.

## 4.3. The United Kingdom

Based on the European Union Horizon 2020 program, ARETE (Augmented Reality Interactive Educational Ecosystem) is developing an AR ecosystem in Europe. In this project, the Open University of the United Kingdom has a major role in supporting technology. In this initiative, the Open University in the United Kingdom plays a significant role in facilitating technological advancements. Augmented Reality (AR) tools are available for educators and learners, providing them the opportunity to engage with and exchange immersive experiences.

The FLTMAG (Foreign Language Technology Magazine) has hosted a few discussion threads on the use of Augmented Reality (AR) in the teaching and learning of a foreign language. One of the articles by Karacan, A.,

&Akoğlu, S. (2022) argued that AR plays a major in language education with an emphasis on the teaching and learning of vocabulary. It provides information about the experiences with the pre-service English language teachers, textbook designers, material developers, and EFL teachers and students on the use of AR flashcards for vocabulary building, creating collaborative AR-enhanced projects, and improving engagement through 3D visualizations. AR.

The International Association of Language Learning Technology (IALLT) Interview Project Episode 8 on AR & VR: Augmented Reality and Virtual Reality for the Foreign Language Learning by Regina Kaplan-Rakowski, Randall Sadler, and Tricia Thrasher explained the functioning of AR&VR in the present educational sector and also addressed the issues, particularly with the assessment and evaluation criteria for successful learning outcomes.

## 4.4. India

The National Education Policy (NEP) 2020 in India incorporates digital content for learning and teaching methods. NEP 2020 advocates blended learning and flipped classrooms to increase learners' and students' engagement in online courses without neglecting the existing classroom instructions.

DIKSHA (Digital Infrastructure for Knowledge Sharing), SWAYAM, (Study Webs of Active-Learning for Young Aspiring Minds, and SWAYAM PRABHA (32 DTH channels) have scaled up to invite digital content for students and teachers and ensure accessibility and quality education. The policy also addresses issues such as restrictions on internet connection in rural areas through schemes like the National Broadband Mission. Strategies with private firms and NGOs focused on acquiring IT products and services at the best prices to cater to the digital requirement gap. Programs like the Pradhan Mantri Gramin Digital Saksharta Abhiyan exclusively target making one member of each household, at least digitally literate, in rural areas. Information Communication Technology fosters interactive whiteboards, web resources, and other education-related technologies for teachers and learners.

### 4.4.1. AR Platforms

There are many language-learning applications and platforms in India that have performed quite well for enhancing language learning, particularly in English.

BYJU's (Think and Learn App) is one of the leading platforms in the country with English learning units. It offers detailed fun-based learning experiences for K-12 children. The application provides assessments, games, and personalized content for an immersive experience for the learners. Multibhashi started in Jaipur, provides classes in English and other international languages. It has seen significant progress with over 1.5 million subscriptions. Chittoo depends on chatbots to teach English using Hindi. Its natural language interface has gained attention of more subscribers. EngVarta enables users to practice spoken English. It provides English practice sessions with the trainers.

### 4.4.2. AR Initiatives and Projects

Spatial Computing researchers at the Indian Institute of Technology Madras (IIT Madras) have designed AR/VR applications like an educational application called Memory Bytes to provide a collaborative and interactive environment, especially for children studying in rural schools. The project uses new tools, protocols, techniques, systems, and technologies for an innovative application of augmented and virtual reality for teaching and mastery of languages, history, and natural sciences in particular. The project aims to reduce inequalities in the target population and provide access to educational technology.

Eklavya Model Residential Schools (EMRS) AR-VR Skills Program trains students and teachers in AR/VR technologies in Rajasthan and Uttarakhand with the support of 1Million 1Billion Foundation under the Ministry of Tribal Affairs. The program aligns with the NEP 2020 aiming to increase the use of Information Communication Technology for learning, teaching, and capacity-building purposes.

Muft Internet Initiative is private-public collaboration for implementing AR to improve rural learning outcomes. The project aims to provide immersion and virtual learning models to underprivileged rural areas.

Cambridge University Press and Ludenso collaborated to launch AR-enhanced textbooks that include 3D models, videos, and sounds to make language learning more interactive. The discussion focused on STEM to enhance students' performance. Pilot projects in educational institutions with AR applications like AR flashcards and storybooks improve vocabulary and language skills.

AR-based learning applications effectively integrate into Indian classroom. These applications guide the students to learn grammar rules, practice pronunciation, and speak contextually relevant topics. AR in ELT is in its infancy stage in India, but it has the potential to foster an effective learning context.

### 4.4.3. Major Challenges

- Infrastructure: A key issue with AR-embedded teaching is that many schools do not have the hardware, including smart phones or the devices, necessary for implementing AR-based learning.
- Teacher Training: Teachers lack proper training programs and workshops on integrating AR modeling into lesson plans.

- Content Development: The curriculum needs revision and revitalization of the content. There is an urgent need to generate local content.

## 5. REVENUE GENERATION

AR has been an emerging market in recent times. Jisc Report (2023-24) looks at the emerging adoption of extended reality (XR) technologies including augmented reality (AR), mixed reality (MR), and virtual reality (VR) in the post-16 education systems in the UK. There is an increased activity level of XR technologies, with 78% of respondents investing in XR and 55% indicating moderate to extensive use of AR.

Mobile phones have become a regular commodity for many people. According to the Augmented Reality Stats (2024-2028) by Josh Howarth (2024) on mobile AR in the market, there is a promising trend for the technology's adoption through 2027.

**Table 1:** Mobile AR market revenue.

| Year | Market Revenue | Increase Over Previous Year | Increase Over Previous Year % |
|---|---|---|---|
| 2021 | $12.45 billion | - | - |
| 2022* | $16.68 billion | ↑$4.13 billion | ↑33.17% |
| 2023* | $21.07 billion | ↑$4.49billion | ↑27.08% |
| 2024* | $25.84 billion | ↑$4.77 billion | ↑22.64% |
| 2025* | $30.77 billion | ↑$4.93 billion | ↑19.08% |
| 2026* | $36.26 billion | ↑$4.49 billion | ↑17.84% |
| 2027* | $39.81 billion | ↑$4.55 billion | ↑9.79% |

**Note:** * Predicted figure.
**Source:** Augmented Reality Stats (2024-2028).

Since mobile AR revenue is showing positive trends, the AR-embedded learning environment can have a positive impact even in less developed nations by addressing other infrastructural requirements, teacher training programs, and acceptance rates from administrators, teachers, and learners.

AR-based English learning applications have been trending in the market in recent years. According to the market.us survey, the AR/VR education market size is very promising and the global revenue in this industry is anticipated to grow upto approximately $75 billion by the year 2033 at an estimated Compound Average Growth Rate (CAGR) of 39.5% from the year 2024. AR/VR technologies are being implemented at all levels of education – from the primary school level, through secondary and tertiary levels, and vocational training. For instance, it revealed that 70% of the community colleges intend to use VR in career training for the fiscal year 2024 against 20% in the fiscal year 2019. AR/VR technologies are effective for enhancing engagement and performance; students have a test performance of 83% superior to old learning methods. In education, greater availability of cloud solutions and developments in hardware (such as HMD and AR glasses) has spurred the adoption of the technology.

### 5.1. Revenue Generation by Language Learning Applications

The public reports do not disclose profit figures, but the estimated revenue figures show tremendous growth and progress.

- According to SpdLoad, Duolingo earned $33 million from in-app purchases in July 2024. Duolingo's annual earnings could be 100 million dollars. The mobile AR market estimated to reach $39 billion by 2027. (https://spdload.com/blog/ar-statistics/).
- Rosetta Stone's annual revenue is approximately $182.7 million.
- Mondly's annual revenue was €11.35 million in 2021.
- BYJU demonstrated an annual revenue crossing $1 billion (₹7,500 crores) by 2023, one of the biggest Edtech companies in India.
- Multibhashi is crossing 1.5 million users.
- EngVarta is increasing its student base across India.
- One of India's start-up companies is Flamingo, which can create animation videos
- PlayShifu brings toys and games in an interactive environment for improving creativity and critical thinking skills.
- GreyKernel builds immersive & gamified content for educational purposes.

AR/ VR market in India valued $4.84 billion in 2023, and expects a potential growth of around 38.3% between 2024 and 2032. The expanding user base and the increased interest in Edtech and language learning suggest a positive inclination towards online learning platforms in the Indian context.

## 6. CONCLUSION

Augmented Reality is expanding in the educational sector. Recent trends in educational and technological innovations have paved a new way for material development in English Language Teaching (ELT). AR promotes creative, engaging, fun filled tasks, materials and activities for the progress of the learner. Hence, the learning

goals should focus on accessibility, sustainability, and inclusivity to reshape educational experiences.

## References

Akçayır, M., &amp; Akçayır, G. (2017). Advantages and challenges associated with augmented reality for education: A systematic review of the literature. Educational Research Review, 20, 1-11. https://doi.org/10.1016/j.edurev.2016.11.002

All India Council for Technical Education. (2023). *Education Post (May-Jun 2023)*. Retrieved from (https://www.aicte-india.org/sites/default/files/Education%20Post_May-Jun2023.pdf)

ARPost. (2020, January 14). *How augmented reality can be used for writing prompts.* ARPost. Retrieved from https://arpost.co/2020/01/14/how-augmented-reality-can-be-used-for-writing-prompts/

Bonner, E., & Reinders, H. (2023). Augmented and virtual reality in the language classroom: Practical ideas. Kanda University of International Studies, Chiba, Japan, and Unitec Institute of Technology, Auckland, New Zealand.

Bower, M., Howe, C., McCredie, N., Robinson, A., & Grover, D. (2014). Augmented Reality in education – cases, places and potentials. Educational Media International, 51(1), 1–15. https://doi.org/10.1080/09523987.2014.889400

Chapelle, C. (2001). Computer Applications in Second Language Acquisition. Foundations for Teaching, Testing and Research. Cambridge: Cambridge University Press.

Garzón, J. (2021). An Overview of Twenty-Five Years of Augmented Reality in Education. *Multimodal Technologies and Interaction*, 5(7), 37. https://doi.org/10.3390/mti5070037

Godwin-Jones, R. (2016). Emerging Technologies Augmented Reality and Language Learning: From annotated vocabulary to place-based mobile games. Language Learning & Technology, 20(3), 9-19. Retrieved from https://pdfs.semanticscholar.org/8754/09a71a165297fc836d6ca76f2916556f0d49.pdf

Howarth, J. (2024, March 27). Augmented reality stats (2024-2028). *Exploding Topics*. Retrieved from https://explodingtopics.com/blog/augmented-reality-stats

IdeaUsher. (2023). Augmented reality app development for education: Enhancing learning experiences. *IdeaUsher*. Retrieved from https://ideausher.com

International Association for Language Learning Technology (IALLT). (n.d.). Interview Project Episode 8: Augmented and Virtual Reality in Language Education. *IALLT*. Retrieved from https://iallt.org

JISC. (2023). Extended reality in learning and teaching: Report 2023-24. JISC. Retrieved from https://www.jisc.ac.uk/reports/extended-reality-in-learning-and-teaching-report-2023-24.

Karacan, A., & Akoğlu, S. (2022). Augmented reality in language education: dARe to know. *The FLTMAG*. Retrieved from https://fltmag.com/augmented-reality-in-language-education-dare-to-know/

Learnfinite. (n.d.). Ministry of Tribal Affairs to train students & teachers at Eklavya Model Residential School in AR/VR skills. Learnfinite. Retrieved from https://learnfinite.com/ca/ministry-of-tribal-affairs-to-train-students-teachers-at-eklavya-model-residential-school-in-ar-vr-skills.

Liu, Y., Holden, D., & Zheng, D. (2016). Analyzing students' language learning experience in an augmented reality mobile game: An exploration of an emergent learning environment. *Procedia - Social and Behavioral Sciences*, 228, 369-374.

Lu, H. M., Lou, S. J., Papa, C., & Chung, C. C. (2011). Study on influence of adventure game on English reading confidence, motive and self-efficacy. In International Conference on Technologies for E-Learning and Digital Entertainment (pp. 430-434). Berlin, Heidelberg: Springer.

Market.us. (n.d.). Augmented and Virtual Reality in Education Market. *Market.us*. Retrieved from https://market.us/report/augmented-and-virtual-reality-in-education-market/

Maryville Online. (n.d.). Augmented reality in education: Interactive classrooms. *Maryville Online*. Retrieved from https://online.maryville.edu/blog/augmented-reality-in-education/

Parmaxi, A., & Demetriou, A. A. (2020). Augmented reality in language learning: A state-of-the-art review of 2014–2019. *Journal of Computer Assisted Learning*, 36(6), 861-875. https://doi.org/10.1111/jcal.12486

Reinders, H., Lakarnchua, O., & Pegrum, M. (2015). A trade-off in learning: Mobile augmented reality for language learning. In M. Thomas & H. Reinders (Eds.), Contemporary Task-Based Language Teaching in Asia, (pp. 244-256). London: Bloomsbury.

Ripert, D. (2022, February 2). Top 5 augmented reality trends for 2022. *Entrepreneur*. Retrieved from https://www.entrepreneur.com/article/412819

Saltan, F., & Arslan, Ö. (2017). The use of augmented reality in formal education: A scoping review. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(2), 503-520.

Schwienhorst, K. (2012). Learner Autonomy and CALL Environments. New York: Routledge.

Sirakaya, M., & Alsancak Sirakaya, D. (2018). Trends in educational augmented reality studies: A systematic review. *Malaysian Online Journal of Educational Technology*, 6(2), 60-74.

Southgate, E., Blackmore, K., Pieschl, S., Grimes, S., McGuire, J., & Smithers, K. (2018). Artificial intelligence and emerging technologies in schools: A research report. *University of Newcastle, Australia*.

Spdload. (2024). Top AR statistics to know in 2024: Market trends, adoption, and use cases. *Spdload*. Retrieved from https://spdload.com/blog/ar-statistics/

Technology Educ. (n.d.). 15 best AR apps for education. *Technology Educ*. Retrieved from https://technologyeduc.com/15-best-ar-apps-for-education/

UCAT. (2018). The Growth of Augmented Reality Applications in USA Educational Systems – UCAT Utah College of Applied Technology. Ucats.org. https://www.ucats.org/the-growth-of-augmented-reality-applications-in-usa-educational-systems.html#Types_of_AR_Technologies_Being_Used

Yang, Y., Wu, S., Wang, D., Huang, Y., & Cai, S. (2019). Effects of learning activities based on augmented reality on students' understanding and expression in an English class. In *Proceedings of the 27th International Conference on Computers in Education* (pp. 685-691).

Zhang, D., Wang, M., & Wu, J. G. (2020). Design and implementation of augmented reality for English language education. In V. Geroimenko (Ed.), *Augmented Reality in Education* (pp. 255-275). Cham: Springer. https://doi.org/10.1007/978-3-030-42156-4_12

Zhang, R., Zou, D., & Cheng, G. (2024). Concepts, affordances, and theoretical frameworks of mixed reality enhanced language learning. *Interactive Learning Environments*, 32(7), 3624-3637.