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# Emerging Technologies for Language Teachers

**[1]Edward Povey**
[1]Graduate School of Education, Hankuk University of Foreign Studies,
Seoul, South Korea.

**Abstract**

*This paper explores the potential impacts of emerging technologies on language education. As technology continues to permeate various aspects of our lives, including commerce, work, socializing, and education, it has undergone significant evolution in the field of education. From the establishment of computer labs and internet connectivity to the proliferation of personal devices in classrooms, the role of technology in education has become more prominent. This paper focuses on the potential of emerging and imminent technological advancements to revolutionize language education, akin to the transformative effects of computers, smartphones, and desktop publishing software. It begins by examining the historical development of educational technology in language learning and defining emerging technologies. Subsequently, it explores several advancements in the field and discusses their potential implications for language teachers and the broader language education community.*

***Keywords:*** *Educational Technology, Metaverse, AI, XR, VR, AR.*

## 1. Introduction

Technology use has permeated nearly every aspect of our everyday lives. Commerce, work, socializing, and education have all been transformed by the Internet and ICT (Information & Communications Technology). In education, technology use and influence on the field have evolved through several stages. When computers were expensive and specialized, many schools, institutions, and universities set up computer labs, which were then internet-connected as web usage grew. With the advent of laptop computers, students started to bring their portable computers into institutions to study, take notes, and complete assignments. In recent years, as personal technology has become more embedded in our general lives, the shift has been towards discretional BYOD (Bring Your Own Device) classrooms where many students are bringing their own personal smartphones and tablet computers. As stated by Becta (2007):

*An overarching theme is that of knowledgeable users customising their tools, services, sources of information, methods of communication and networks of people to suit their personal needs. Distinctions between learning, socialising, working, playing and entertainment are beginning to blur, along with when, where and with whom these activities take place. (p.4)*

Students and learners wield authority over their digital realms and technology usage, marking a shift into an era where institutions no longer dictate or control technology utilization. The choices are to ignore the lived reality of students' lives with technology, to react as students acquire and utilize new technologies, or for teachers to regularly update their practices and expertise with educational technology usage and implementation to be ahead of potential shifts. This paper addresses the latter option in considering emerging and imminent technological developments that have the potential to change language education in the same way as the computer, smartphone, and desktop publishing software did before. First, a look at

educational technologies in language learning and what it means to be an emerging technology. Then, an examination of several advancements in the field and a discussion of potential ramifications for language teachers.

**Educational Technology in Language Education**

Technology in education can be broadly categorized into hardware, software, and services, with each intersecting the others. The growth of computers in schools has led to the field of Computer-Assisted Language Learning (CALL). The earliest CALL programs were simple drills and exercises, but over time they became more sophisticated, incorporating multimedia elements and artificial intelligence. Decades later the rise of smartphone devices led to Mobile-Assisted Language Learning (MALL) and web-based language learning. This included the development of virtual classrooms, online language exchanges, and language learning games and apps.

Each of these eras brought new software and services, as well as related approaches, pedagogies, challenges, and solutions in the field of language education. The growth of the internet has also blurred the way that we communicate in terms of learning, socializing, work, play, and entertainment (JISC, 2011). The new interconnected and networked digital landscape has transformed education and language learning (Eisenmann, 2021) as the internet has developed from WEB 1.0 read-only (simple) format to the Web 3.0 read-write-execute (semantic) format. This new digital context has led to the rise of services as a principal category in educational technology. This encompasses virtual learning platforms, learning management systems, language learning apps, video conferencing platforms, and more, which are often offered as a paid service, often with a free tier, or a service combined with downloaded software. This could raise future challenges as more and more services require account log-ins and paid subscriptions to unlock features.

As new technologies continue to emerge and transform society, it is imperative for teachers to be aware, ready, and prepared for how these new developments could potentially redefine education.

**Emerging Technologies in Language Education**

The pace of technological change and development over the last few centuries has meant there is a constant migration of technologies from fringe to mainstream. On the fringe are emerging technologies, which are those that currently exist and have potential for widespread adoption yet have not reached common usage (Cukurova & Luckin, 2018).

*Veletsianos (2016) describes the characteristics of emerging technologies and emerging practices.*
*Emerging technologies and emerging practices are not defined by newness.*
*Emerging technologies and emerging practices are evolving organisms that exist in a state of "coming into being".*
*Not-yetness: Emerging technologies and emerging practices are not yet fully understood or researched.*

Emerging technologies and emerging practices have promising but as yet unfulfilled potential

These characteristics imply that emerging technologies are not always entirely novel. They encompass technologies with potential that have not been fully implemented. This implementation process can span many years or even decades, despite the evident benefits and possibilities of the technology. The varying adoption rates can catch us unprepared when technologies become widely used. Therefore, educators and the education sector must remain aware and continuously informed about new developments (Crowne, 2007). Furthermore, educators need to consider new approaches and pedagogies that are made possible or necessary with the advent of new technologies (Veletsianos, 2016).

The period during the COVID-19 pandemic is an example of a time when new technologies, such as virtual platforms, and new pedagogies, such as online learning, were propelled into common usage (Vishnu et al, 2022). Although some institutions were not prepared for this change, the integration of digital learning and digital devices into education can make the educational environment more dynamic and engaging while increasing participation and practicing skills for professional success (Haleem, Javaid, Qadri & Suman, 2022). Teachers and learners may take on new roles as communication is revolutionized by these changes (Emerging Practice in a Digital Age, 2011).

However, for technologies that have yet to emerge into widespread adoption, the implications of their uptake may not yet be clear (Veletsianos, 2016). Indeed, many teachers may be reluctant or unsure of how to use technology and not as comfortable as their students (Marek & Wu, 2019). As educators embark on integrating emerging technologies into language education, they must maintain vigilance, adaptability, and knowledge. Embracing novel pedagogical methods, harnessing technological advancements, and addressing ethical concerns are vital for unlocking the complete potential of emerging technologies, thereby fostering vibrant and inclusive language learning environments.

This paper will explore two emerging technologies that are shaping the educational landscape: (A) Artificial Intelligence and (B) Metaverse and Extended Reality.

**Artificial intelligence (AI)**

Artificial Intelligence (AI) has long been regarded as a development that has the potential to fundamentally change work, education, and society. However, in recent years this change has become more self-evident throughout society (Cukurova & Luckin, 2018). The possibilities and ramifications of AI are “not science fiction anymore” (Strasser, 2021). Despite this, many educators are not prepared for the way the way AI could impact our lives (Ng, Leung, Su, Ng & Chu, 2023).

Artificial Intelligence in Education (AIED) can enable learning to be more personalized, flexible, and inclusive, as well automating aspects of teaching such as assessment and feedback (Southgate et al, 2019). AIED encompasses automatic evaluation systems, translation tools, intelligent tutoring systems, chatbots, virtual avatars, and virtual learning environments (Jiang, 2022). AI can focus on skills such as learning and understanding, adapting to decisions and decision-making, and problem-solving (Strasser, 2021). Key characteristics of AI include adapting to students’ needs, providing instant feedback, error correction, the changing roles of teachers, and the potential for deeper language learning (Rohalevych, 2020). Services that utilize AI for language learning and feedback include Duolingo, Grammarly, Babbel, and Mondly.

In an informal survey of my students at a higher education institute, around half of the students actively use Grammarly for generating ideas, checking grammar, suggesting vocabulary, and helping to maintain the correct level of formality in their writing. Grammarly utilizes artificial intelligence (AI) technology in its grammar-checking and writing assistance services. Grammarly's AI algorithms analyze user text input and provide suggestions for grammar, punctuation, spelling, clarity, conciseness, style, and vocabulary enhancements. The AI behind Grammarly's services works by parsing the text, identifying potential errors or areas for improvement, and offering contextually relevant suggestions to help users improve the quality and correctness of their writing. It continuously learns from user interactions and feedback, allowing it to become more accurate and effective over time.

A recent innovation in AI that has sparked controversy and debate amongst many fields and sectors, including education, is ChatGPT, which is akin to an advanced chatbot, text generator, and search engine developed by OpenAI. ChatGPT is currently on version 3.5. Generative Pre-trained Transformer (GPT) architecture is a language model that has been trained on large amounts of text so that it can understand questions, queries, and prompts and then generate human-like responses and text with generally valid content. The implications of this for society meant that many leaders in technology and other fields have called for a 6-month moratorium on the development of AI above the level of GPT-4 (ChatGPT is currently running on GPT-3.5) due to its potential impact ("Pause Giant AI Experiments: An Open Letter," 2023).

In the education sector, Heaven (2023) reports how educators were initially unprepared and resistant with some school districts blocking access to the website for ChatGPT. There were fears about cheating and plagiarism, with students being able to bypass problem-solving and critical-thinking skills in place of AI-generated assignments. However, Heaven reports that many educators and institutions have overcome their initial concerns and are now considering how AI such as ChatGPT can augment student assignments. This seems like a rational approach as these tools are already publicly available and only likely to become more widespread with adoption. Educators have adapted in novel ways such as teaching students about prompts for generating AI responses and then evaluating the content and biases of the responses. Indeed, this may help to provide more focus on higher-order thinking skills while overcoming the initial building blocks of essay writing, in much the same way that the flipped classroom can use technology for content delivery leaving more face-to-face class time for questions, discussions, and tasks.

AI can be used to provide personalized learning experiences, adaptive feedback, and intelligent tutoring systems that can help learners achieve their goals more effectively. This technology could transform the role of teachers, by providing them with tools and data that can help them better understand learners' needs and progress. AI can also be used to automate administrative tasks, freeing up teachers' time to focus on teaching and learning. However, there are also concerns about the ethical implications of AI in education, such as the potential for bias, and the impact on privacy and data security. It is important to address these concerns and develop ethical guidelines for using AI in education. Overall, the integration of AI into education has the potential to improve educational outcomes, increase access to education, and enhance the quality of teaching and learning experiences. However, teachers will need to be aware of potential negative issues around bias, fairness, over reliance on technology, privacy and data security, ethical considerations, and genuine skills acquisition.

**Metaverse and Extended Reality (XR)**

The metaverse is a concept that refers to a collective virtual shared space, created by the convergence of virtually enhanced physical reality and persistent virtual reality. It's often envisioned as a vast, interconnected digital universe where people can interact with each other and digital objects in real time, regardless of physical location. In the metaverse, users can engage in a variety of activities, including socializing, gaming, entertainment, education, commerce, and more. It's envisioned as a dynamic and immersive environment that blurs the boundaries between the physical and digital worlds.

According to Wang et al. (2023), the characteristics of the metaverse can be summarized as follows:

**Immersiveness**

Users feel psychologically and emotionally immersed in a realistically simulated virtual environment, engaging their senses and bodily interactions.

**Hyper Spatiotemporality**
The metaverse transcends the constraints of time and space found in the real world, enabling seamless movement across diverse virtual worlds with varying spatiotemporal dimensions.

**Sustainability**
The metaverse maintains a self-sustaining economic loop and value system, fostering continuous user engagement in content creation and open innovation while operating on a decentralized architecture to avoid central control.

**Interoperability**
Users can move between virtual worlds without disruption to their immersive experience, and digital assets can be exchanged across different platforms for rendering or reconstructing virtual environments.

**Scalability**
The metaverse efficiently accommodates varying numbers of concurrent users, scene complexities, and modes of user interactions.

**Heterogeneity**
The metaverse comprises diverse virtual spaces, physical devices, data types, communication modes, and human psychology, leading to challenges in interoperability among metaverse systems.

Extended Reality or Cross Reality (XR) serves as an overarching term encompassing various immersive technologies, presenting electronic, digital environments where data are represented and projected (Mystakidis, 2022). XR includes Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). VR is an alternate, wholly distinct, digitally fabricated realm where users perceive complete immersion. In contrast, AR introduces embedded virtual elements into physical spaces to enrich them. It spatially integrates the physical and virtual realms. Additionally, AR can be integrated into VR headsets with pass-through mode, displaying input from integrated camera sensors.

In VR systems, Rosenblum and Cross (2016) highlight three fundamental characteristics: Immersion, interaction, and optical fidelity. Immersion denotes the extent to which users feel mentally transported to an alternate, synthetic world. Interaction also presents in two forms: manipulation, creation, and modification of virtual objects, and interpersonal engagement with others sharing the same virtual environment. Optical fidelity contributes to the suspension of disbelief, fostering a sense of presence in an entirely synthetic, artificial space.

Presently, there's a fervent race to establish the infrastructure, protocols, and standards governing the metaverse. Major corporations are vying to develop their closed ecosystems to entice users, aiming to dominate as the premier metaverse hub. Companies like Meta, Apple, Roblox, Fortnite, and Decentral and are actively exploring and investing in the development of metaverse experiences. Different companies and technology providers are adopting diverse approaches and conflicting strategies centered on principles such as openness and privacy. The outcome will shape user privacy rights and the accessibility of the metaverse to students. These issues hold significant implications for education, influencing the potential mainstream integration of the metaverse into e-learning.

However, according to the Digital Learning Innovation Trends report (2020) pockets of innovation in education remain largely isolated and haven't spread across institutions to

enhance student access and success. For example, faculty and institutions lack the necessary skills and technology to develop VR simulations or AI-driven software applications aligned with the pedagogical goals of courses and the learning needs of students. These innovations hold significant potential for educational and learning purposes, and as the design and development of VR and AI become more accessible to institutions and faculty, diffusion may increase.

Once metaverse technologies and services become integrated into educational facilities, a multitude of potential uses emerge:

**Immersive Language Learning Environments**
Language learners can immerse themselves in virtual environments where they can interact with native speakers, participate in simulated real-life situations, and practice language skills in authentic contexts. Virtual environments can replicate everyday scenarios such as shopping, traveling, or dining out, providing learners with opportunities to apply language skills in practical settings.

**Virtual Language Exchanges**
The metaverse can facilitate language exchange programs by connecting learners with speakers of their target language from around the world. Virtual platforms can enable synchronous communication and collaboration, allowing learners to engage in real-time conversations, share cultural experiences, and receive feedback on language usage.

**Cultural Immersion**
Virtual environments in the metaverse can expose language learners to diverse cultural experiences and perspectives. Learners can explore virtual representations of cultural landmarks, festivals, and traditions, gaining insights into the customs, values, and practices of native speakers.

**Interactive Language Activities**
Language teachers can design interactive language activities and games within virtual environments to engage learners and reinforce language concepts. Virtual scavenger hunts, role-playing simulations, and language-based quests can promote active learning and collaboration among students.

**Virtual Tutoring and Mentoring**
Language educators and tutors can offer virtual tutoring sessions and language coaching services within the metaverse. Through one-on-one or small group interactions, learners can receive personalized feedback, guidance, and support to improve their language proficiency and fluency.

**Digital Language Resources**
The metaverse can serve as a repository for digital language resources, including multimedia content, interactive textbooks, language learning apps, and online courses. Learners can access a wide range of materials and resources tailored to their language learning needs and preferences.

**Cultural Exchange Programs**
Schools and educational institutions can establish virtual cultural exchange programs with partner institutions in other countries. Through virtual exchanges, students can interact with peers from diverse cultural backgrounds, practice language skills, and develop intercultural competence.

## 2. Conclusion

In conclusion, the integration of emerging technologies into language education represents a paradigm shift with profound implications for both educators and learners. From the historical evolution of educational technology to the advent of emerging technologies like artificial intelligence and the metaverse, the landscape of language education is undergoing rapid transformation.

Artificial intelligence offers personalized learning experiences, adaptive feedback, and intelligent tutoring systems that have the potential to revolutionize language learning. However, concerns about bias, privacy, and over-reliance on technology must be carefully addressed to ensure ethical and effective implementation.

The metaverse and extended reality present exciting opportunities for immersive language learning environments, virtual language exchanges, cultural immersion experiences, interactive language activities, virtual tutoring and mentoring, and digital language resources. These innovative approaches have the potential to enhance language acquisition, promote intercultural understanding, and foster collaboration among learners from diverse backgrounds.

As educators navigate the complexities of integrating emerging technologies into language education, they must remain vigilant, adaptable, and informed. Embracing new pedagogical approaches, leveraging technological advancements, and addressing ethical considerations are essential for harnessing the full potential of emerging technologies to create dynamic and inclusive language learning environments.

In this ever-evolving digital landscape, educators play a crucial role in shaping the future of language education, empowering learners to thrive in a globalized and interconnected world. By embracing innovation, fostering collaboration, and prioritizing the needs of learners, educators can harness the transformative power of emerging technologies to create meaningful and impactful language learning experiences for all.

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