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Technology-Enhanced Language Education Revisited: A Developmental Perspective

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The traditional landscape of education has been widely inundated with an array of technologies and technological tools in recent decades. Technology, if effectively integrated, offers promises to unleash the learners' full potentials. Multiple researchers have explored the perceptions of language educators and learners alike (e.g., Khoshnevisan, 2019a; Cheng & Tsai, 2014; Cheng & Tsai, 2016). Other researchers have investigated the role of technology on the cognitive achievement of language learners in different language skills. Khoshnevisan (2019a) reiterates that the common thread amongst tools harnessed in technology-enhanced language education is that technology, largely, enhances comprehension, increases cognitive attainment and motivation level of learners. This article begins with a chronological review of the advent of technology in the realm of language education. Then it presents contradictory, yet scholarly, opinions of researchers documented and corroborated with empirical research concerning the use of technology in language education. To achieve that, the author will embark on detailing how technology affords language teachers. The backbone of the article is an evidence-based discussion regarding the motivational factors taken place by technologies. Having scrutinized the role of technology in language education, the authors will delineate technologies recently employed to increase the motivation level of students. This article also discusses the constraints of technology and sheds light on potential challenges that both language educators and learners may encounter, including educators' lack of knowledge about technology and limitations of technologies.

Introduction

In the field of language education, no matter how high one flies, they may end up landing on one form of technology. The plateau of language education has mushroomed with different forms of technologies in recent years. Nevertheless, the permeation of educational technology in language education does not guarantee the positive impact of these technological tools on the students' cognitive attainment and motivation level when learning a new language (Khoshnevisan, 2019a). While research findings of the impact of technology on language education imply that these technological tools have the potential to unleash learners' capacities, growing evidence indicates that inappropriate incorporation of technology in language education may not amount to facilitating the process of language learning (Clark, 1994; Kozma, 1994; Khoshnevisan, 2019a).

To investigate the role of technology in language education, researchers have scrutinized the impact of technology on learning gains of the participants and explored the perceptions of both language educators and learners (Amer, 2014; Cheng & Tsai, 2016; Di Serio, Ibáñez & Kloos, 2013; Küçük, Yýlmaz, & Göktaþ, 2014; Park & Khoshnevisan, 2019a; Rashtchi & Khoshnevisan, 2008; Reinders & Lakarnchua, 2014; Smeets & Bus, 2012; Specht, Ternier, & Greller, 2011; Trushell, Maitland, & Burrell, 2003; Wojciechowski & Cellary, 2013; Wu, Chang, & Liang, 2013; Yang, 2011). This attempt seems to be the first step to analyze the role of technology in language education from learners', educators',

and material designers' viewpoints. In so doing, we dedicate our efforts to portray the advent of technology to the language education domain along the continuum of technology ranging from media to emerging technologies. On this account, we will detail different types of technologies harnessed in language education. The affordances of using technological tools in language education apart, the constraints of technological tools in language education, will be finally put forth.

Technology in Language Education

The need for the use of media and technology in education is a topic of intense research (Khoshnevisan, 2019a). Researchers have recently argued that in the past few decades, technology-mediated pedagogy has formed the backbone of research in second language acquisition (Khoshnevisan, 2019a). Many researchers have investigated whether media/technology-enhanced pedagogy facilitates the process of learning (Khoshnevisan & Le, 2018; Khoshnevisan, 2019a; Clark, 1983; Kozma, 1991, 1994). As the technological tools advanced and matured in the context of language education, the form of pedagogy has dramatically changed. Khoshnevisan (2019a) emphasized the fact that contradictory results in technology-infused research prompts researchers of the field to examine the impact of different types of technological tools such as emerging technologies on learning a second language.

Clark (1983) characterized media as "…vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" (p. 445). Amongst the against-media-effect adherents, Clark (1983, 1994) put forth two distinct reasons why media does not inform learning. Firstly, media and method are two diverse concepts. Additionally, at the time, research findings did not imply positive media effects. However, Kozma (1994) delineated that the impact of media on language education is yet to be revisited entirely. Consistent with Kozma, Mielke (1968) stated that irrespective of the type of media used in different studies, the results lead to "no significant difference." Clark (1983)—inconsistent with recent research (Khoshnevisan, 2020a)—reported that the results of the use of technology, regardless of the type of technology harnessed, on cognitive attainment is almost always the same. He reiterated that there were multitudinous confounding variables in the technology-related studies that the results lack sufficient convincing evidence to confirm or disconfirm the findings. One of these confounding variables is the novelty of different types of technologies that immensely impact learner's achievements at the early stages of the learning process. However, the interest of learners admittedly wanes as the course advances. The role of media in the pertinent literature is extensively researched. However, with advances in technology and with the advent of technological tools and emerging technologies, researchers deem that there exist other contributing factors in the students' learning process (Khoshnevisan, 2019a).

Amongst the many prominent factors that are crucial in the learning process, Khoshnevisan (2019a) held that instructional methods and the role of teachers are vital. Salomon (1979) presented a distinction between instructional method and media emphasizing that *instructional method* is characterized as "any way to shape information that activates, supplants or compensates for the cognitive processes necessary for achievement or motivation" (p.23). *Media*, conversely, is viewed as "delivery vehicles for instruction and do not directly influence learning" (Clark, 1983, p.453). By way of extension, it can be construed that the instructional method has supremacy over the media or technology employed for learning. As such, instructors come at the forefront of the learning process. Instructors can not only tailor instructional methods but also, make the necessary changes in the "vehicle" or technology through which learning takes place. In short, instructors' role overweighs that of medium or even instructional methods (Kulik, Kulik, & Cohen, 1980; Clark, 1983).

Khoshnevisan (2019b) stressed that different foreign language education programs in the US have widely exploited technological tools. Alden (2016) explained how technology-enhanced language education afforded the language learning process in America. He reiterated that the post-war curriculum was informed by technology-infused courses, which fostered collaboration amongst language learners. Consistent with the above, Geisler (2016) detailed how language schools such as Middlebury language schools incorporated technology in an attempt to integrate technology and develop hybrid language courses in the years to come.

In the past decades, technology has extensively plagued education. Technological tools have been exploited by language teachers to facilitate the complex process of language learning (Khoshnevisan, 2019b; Park & Khoshnevisan, 2019). However, the use of emerging technologies in language education has recently come to fruition in second language acquisition (Khoshnevisan & Le, 2018). Researchers have exploited technologies to investigate the impact of technological tools and explore the perceptions of both language educators and learners: children and parents and an AR book (Cheng & Tsai, 2014); audiotaped dialogue journals (Rashtchi & Khoshnevisan, 2008); interaction of children and parents with an AR picture book (Cheng & Tsai, 2016); augmented reality (Khoshnevisan & Le, 2018); literacy and augmented reality (Park & Khoshnevisan, 2019); augmented reality and teacher education (Khoshnevisan, 2019c); animated pedagogical agents (Khoshnevisan, 2018) to name but a few. Khoshnevisan (2019a, p.85) posited that the question "whether media and/or technology-infused pedagogy makes technology-mediated learning more or less influential" is yet to be thoroughly examined. In what follows, I will portray prominent technologies used in language education.

Rashtchi and Khoshnevisan (2008), in their empirical study, scrutinized the impact of audiotaped dialogue journals on the participants' oral proficiency. Dialogue journal writing is a

common technique to continuously communicate with the students on topics of interest (Peyton, 2000). They help to not only establish rapport with students but also authentically respond to students as an interlocutor. The participants were divided into three different groups and were educated by three different instructional strategies— audiotaped dialogue journal, dialogue journal writing, and traditional free speech—to hone their speaking skills. The results of the ANOVA test implied that the oral proficiency of the three mentioned groups significantly differed. A follow-up Tukey test revealed the supremacy of the use of audiotaped dialogue journals over traditional methods of free speech courses.

Computer-Assisted Language Learning (CALL)

The use of computer-assisted language learning is a long-standing research topic. Khoshnevisan (2018a) gave a rather comprehensive picture of the use of computer-assisted language learning (CALL) tools in idiom learning. Khoshnevisan (2018a,) mentioned that

recent studies have focused on a variety of methods and tools to facilitate idiom acquisition, empower recognition, and recall skill: animated, unanimated (funny) pictures, mobile learning, multiple intelligences, natural text recognition and its relations with web 2.0, Disney movies, etymological tools, and software are among the most recent ones. (p.75)

He, however, reiterated that we are yet to explore the most effective tools to facilitate the language learning process. He detailed the difficulties and ubiquity of idiomatic phrases and multiword units in the English language and how culture and context are critical in the learning process (see Khoshnevisan, 2018b). Additionally, it is worth mentioning that the idiom processing for L1 and L2 immensely differ (Khoshnevisan, 2019e). To facilitate the process, many material developers and language educators have made a concerted effort to integrate idiom learning with a variety of technological and motivational tools (humorous visuals: Gharderi & Afshinfar, 2014; static pictures: Andarab & Rouhi, 2014; Disney movies: Khoshniyat & Dowlatabadi, 2014; Mnemonics, authentic conversations, and idiom displaying techniques: Guduru, 2012; using apps: Amer, 2014; etymological elaboration: Noroozi & Salchi, 2013; multimodality and idiom learning: Khoshnevisan, 2019d). However, many of these findings are not generalizable and convincing since sufficient evidence to substantiate and corroborate the results does not exist. Khoshnevisan (2018a, p. 81) further claimed, "Today's software is much concerned with colors, spatial (picture and related narration in proximity) and temporal contiguity (simultaneous narration and picture) principles." To fill the existing gap in idiom learning with the use of apps, he proposed using animated pedagogical agents (APAs). He further reported that the use of APAs is on the rise because idiom learning calls for the utilization of APAs as learning assistants to decode the figurative meaning of idiomatic phrases.

Parallel with the growing recognition of the role of CALL in language learning and consistent with the above discussion, Khoshnevisan (2019d) highlighted how multimodality (Kress & Leeuwen, 2001) facilitated the language learning process. He further reported that multimodality not only covers a variety of learning styles but also facilitates the language learning process. He detailed that websites afford learners with the image, audio, video, and translation of idioms. To harness the full potential of language learners, websites—embracing multimodality—can offer a variety of ways to serve as a catalyst in language learning. Utilizing different modes of instruction, such as image, audio, video, and translation, learners experienced a higher motivation level in learning. It, thus, appears that using CALL-related technologies can help language learners develop their skills.

In Alignment with the development of websites in learning languages, language apps play a vital role in learning languages. Apps are a prominent feature of cell phones and help users in different aspects. Owing to the fact that Since mobile apps are predominantly cost-effective, and they are easy to access, many researchers have employed them to teach different languages. Hadid, Mannion, and Khoshnevisan (2019) explained how language learning apps could "augment vocabulary, integrate skills, and extend learning beyond the boundaries of classrooms" (p. 81). These language learning apps tap into learners' digital intelligence (Mithas & McFarlan, 2017). Like websites, apps have promises to provide learners with multimodality and situated learning, which highlights learners' interaction in a particular context to enhance the quality of learning (Brown, Collins, & Duguid, 1989; Herrington & Oliver, 2000; Lave & Wenger, 1991). Another critical point in language learning apps is that language apps through situated learning make learning experiences more purposeful and contextualize learning experiences (Herrington & Oliver, 2000). Khoshnevisan (2018b) postulated that context and contextualized language is vital in both language learning and assessment. In short, apps and websites can provide the required framework to learn a new language.

Reader Buddy App

Along with the permeation of technological tools in almost every aspect of human life, emerging technologies have been harnessed by language teachers. Hadid, Mannion, and Khoshnevisan (2019) utilized one form of ever-evolving technology known as augmented reality (AR) to make language education fun and easy. The authors stressed that AR-infused textbooks have the potential to enhance the quality of language education. To not only recognize but also realize the potentials, the authors developed an app known as '*Reader Buddy,*' which is an AR-based app that helps students gain an in-depth understanding by providing learners with definitions, examples, and contexts. This ever-evolving app harnesses both QR codes embedded and AR-infused pictures interspersed in the material to provide a digital layer and introduce abstract concepts in different forms (audio, video, and photographs).

Reader Buddy app helps students because, at the beginning of every chapter, AR glossaries employing pictures, videos, and multilingual translations introduce the pronunciations and meanings of new words, thus helping ELs to work at the same pace as their classmates. Additionally, "Reader Buddy videos can include and make use of new and difficult vocabulary to help contextualize the information and act as a steppingstone to facilitate the integration of various skills" (p. 84).

Reader Buddy provides language learners with the comprehension of texts and challenging vocabularies while reading their textbooks. The app was crafted to help language learners with pre, during, and post-reading activities. It provided language learners with the required background knowledge, constructing meaning, and interacting with their peers to develop their understanding. The authors noted that *Reader Buddy* makes "language learning an easier and more enjoyable experience" (p. 86).

Reading Books

Reading books is a prominent and effective way to learn. The vast majority of language learning methods from the grammar-translation method to communicative approaches in language learning include reading books and texts. Hence, researchers, together with material developers, have always made an effort to make a case for a judicious inclusion of technology in reading books. Multiple researchers have employed technology-infused books such as interactive electronic books with language education (Smeets & Bus, 2012; Trushell, Maitland, & Burrell, 2003). Sellen and Harper (2003) report that notwithstanding the affordances that electronic books offer, traditional books are unique due to their tangibility. Learners prefer to have traditional books since they can touch them and easily use them. AR books are another type wherein a digital layer is superimposed to traditional books so learners can benefit from both conventional aspects of books and gain extra information triggered with AR during reading books (Hornecker & Dünser, 2009). Through AR books, readers can experience a novel and motivating way of reading books that include seamless integration of the real and virtual world (McKenzie & Darnell, 2004). Wu, Lee, Chang, and Liang (2013) stated that the abstract concepts of a printed book are subject to misunderstanding owing to the inherent complexities of the abstract concepts. Notwithstanding the amount of complexity in printed books, technology—more specifically, AR—can significantly lessen the prevailing complexity through the authenticity and visualization of the concepts in digital layers offered (Wu et al., 2013).

Augmented Reality (AR)

Park and Khsohnevisan (2019) gave a rather comprehensive account of the use of augmented reality (AR) in literacy development. AR, as the technology of tomorrow, has a lot to offer. Both language educators and language learners can employ emerging technologies to have a unique learning experience. The use of AR in language education has been extensively harnessed: picture books (Cheng & Tsai, 2014); AR-infused material (Chen, Teng, & Lee, 2011; Khoshnevisan, 2020b); 2D barcode and AR (Liu, Tan, & Chu, 2007); teacher education (Khoshnevisan, 2019f); language education (Khoshnevisan & Le, 2018). AR has been defined variously in the pertinent literature. However, one of the working definitions of AR is that of Klopfer and Squire (2008), which posited that AR is "a situation in which a real-world context is dynamically overlaid with coherent location or context-sensitive virtual information" (p. 205). According to Specht et al. (2011), AR offers novel ways to interact with information. In one study, Cheng and Tsai (2014) aimed to explore the behavioral patterns and investigate the learning gains of 33 child-parent pairs. The results of the content analysis revealed four child-parent reading behaviors regarding AR picture book reading. The identified patterns were recognized as follows: parent as dominator, child as dominator, communicative child-parent pair, and low communicative child-parent pair. In a follow-up study, Cheng and Tsai (2016) uncovered the parents' perceptions regarding behavioral transitional patterns for AR picture book reading. The results of the studies imply that the parents' help is central in achieving an in-depth understanding while using AR books. The studies also revealed that children could dominate the reading activity by the use of AR.

Silva, Roberto, and Teichreib (2013) investigated the role of AR in the literacy development of children. The authors adopted a mixed methods approach using pre- and post-tests and an interview to both investigate the participants' cognitive attainment and explore the participants' perceptions concerning AR technology. In this study, ARBlocks were harnessed to foster reading skills and phonemic awareness. ARBlocks are simple blocks with a space in the middle of them that triggers the content with AR technology. In one of the activities, the participants listened to nursery rhymes with missing words. The participants were supposed to use the AR technology incorporated in ARBlocks to fill the blanks. The results of this study implied that AR fosters literacy development, increases the motivation level of the participants, and dramatically changes educators' attitudes to using emerging technologies in their daily practices.

Mobile Augmented Reality (MAR)

Mobile Augmented Reality (MAR) is another growing aspect of AR-infused apps. Nincarean, Alia, Halim, and Rahman (2013) investigated ten different MAR apps to foster literacy in teenagers. One of these MAR apps—employed by the authors—to develop language arts and literacy is known as Alien Contact. Eighty middle and high school children voluntarily used this app to improve their English. The results of the multiple case study corroborated the claim that this app amounts to the high engagement of the students. The results also revealed the beneficial features of the AR technologies as follows: portability, social interactivity, connectivity, context-sensitivity, and individuality.

Game-based AR apps and games have recently gained growing attention in language education. HELLO is one of the most prominent AR-based systems constructed by Liu et al. (2007). Twenty college students voluntarily participated in a study conducted at the University of Taipei for four weeks. The participants encountered 2D barcodes on a campus tour. Through this AR-based study, the participants could interact with a virtual tutor to develop their oral proficiency. The results of this study suggest that HELLO is easy to use, can increase motivation, and improves four skills.

Affordances and Constraints of Technological Tools

The extant literature about the use of technological tools in language education is prolific. Research findings indicate that technologies help both language educators and learners in different aspects. Technological tools afford learners with concretizing abstract concepts (Dori & Belcher, 2005) and contribute to the deeper understanding (Klopfer & Squire, 2008) and visualization of ideas (Kaufmann & Schmalstieg, 2003). Moreover, they boost engagement (Bujak et al., 2013) and develop critical thinking and problem-solving skills (Dunleavy, Dede & Mitchell, 2009). Another advantage of technological tools is that they help learners enjoy the learning process (Núñez et al., 2008), making it more appealing and useful (Wojciechowski & Cellary, 2013). They draw learners' attention (Aziz et al., 2012), establish links with the real environment (Ternier et al., 2012), facilitate comprehension (Ivanova & Ivanov, 2011), and increase motivation (Di Serio et al., 2013).

The literature concerning emerging technologies indicates learners' positive attitude toward technology-mediated material (Billinghurst, Kato, & Poupyrev, 2001; Clark & Dünser, 2012). The results of the studies imply improvements in students' gains in different areas, including vocabulary (King, 2016), literacy (Cheng & Tsai, 2016), and language skills (Liu, 2009). Few studies corroborated the theory that children benefit from AR books (Cheng and Tsai, 2014; Dünser & Hornecker, 2007; Hornecker & Dünser, 2009). Usefulness, ease of use, and satisfaction while utilizing technology-infused books has been confirmed in different studies (Billinghurst, Kato, & Poupyrev, 2001; Clark & Dunser, 2012).

Yang (2011) reported that constant exposure to the target language is an efficient way to communicate with community members and improve language proficiency. However, it comes as no surprise that time and financial constraints may impede language learners from realizing this dream. Technological tools appear to be an effective way to supply language learners with authentic language in classrooms. These technological tools are useful and easy to use and motivate language learners (Billinghurst, Kato, & Poupyrev, 2001; Clark & Dunser, 2012).

Khoshnevisan and Le (2018) reported several concerns regarding the use of technology in language education (e.g., the sustainability of the application in a big classroom in a

long-term, and insufficient class time) that need to be addressed. One of the significant drawbacks in the studies related to emerging technologies is that language educators are predominantly unfamiliar with technology. The unfamiliarity of language educators with technologies, coupled with the lack of confidence to utilize technologies in educators' daily practice, are prominent constraints of the use of technology in language education. Khoshnevisan and Le (2018) called for an overriding need to educate instructors and practitioners concerning the use of emerging technologies such as AR in classrooms.

Technology per se may notoriously impose severe queries on educators. Reinders and Lakanchua (2014) underwent serious challenges while using AR in classrooms. They experienced some technical difficulties with Wikitude; therefore, they had to use other user-friendlier tools for college students to create an AR-based virtual tour. Researchers might have to spend much time during the early stages of crafting an AR-related app or game, which causes frustration among a majority of both researchers and participants. Thus, researchers are advised to take more time at the early stages of designing and piloting a study to maintain the participants' motivation level. The significant challenges of AR, however, emanate from the fact that AR technology is still in its infancy (Wu, Lee, Chang, & Liang, 2013). A limited number of AR apps or AR-connected devices are available for educators and students. Few educators know how to utilize AR; nonetheless, they still hesitate to effectively employ it in their practice (Alkhattabi, 2017). Wu et al. (2013) also cautioned us that language learners could be cognitively overloaded when working with technology. The current AR content designs are inflexible to pique their interests and meet the needs of various students (Dunleavy, Dede, & Mitchell, 2009; Wu et al., 2013). Finally, there are several conflicting findings in technology-related studies, especially those on the correlation between the integration of AR and learner's cognitive load (Küçük, Yýlmaz, & Göktaþ, 2014).

Pedagogical Implications

Revisiting the underlying and prominent effects of technology in language education enables us as language educators and researchers to gain insight into employing technology in our daily practice. Noting that technology burgeons a myriad of affordances, one cannot ignore the potential limitations accompanied with these technological tools. Drawing on the existing affordances discussed, language educators can and should integrate the existing tools in their practice for different language skills. For instance, in terms of emerging technologies, there are a few apps developed and readily accessible free. Language educators can exploit apps in their classrooms.

One recommendation is that supervisors hold professional development sessions to enhance educators' understanding and hone their skills to incorporate technology in instructional strategies (Khoshnevisan, 2019f). According to Khoshnevisan

and Le (2018), one of the limitations of using technology in classrooms is educators' lack of knowledge and confidence in exploiting these tools. It is, thus, evident that more professional development sessions for language teachers are necessary. These sessions can be held during teachers' different developmental stages (for more discussion about developmental stages of teachers see Khoshnevisan, 2017; Khoshnevisan 2018c; Rashtchi & Khoshnevisan, 2019).

Research results imply that technological tools translate into increasing the motivation level of language learners. One of the issues that language educators may encounter in their classrooms, regardless of the audience or teaching materials, is the motivation level of language learners. Language teachers should utilize one form of effective technology aligned with student learning objectives (SLOs) of the course to tackle the problem. Increasing the motivation level is one thing, and maintaining the same motivation level is still another issue. Technology can be an escape to inject novelty into traditional teaching methods to combat this thorny issue. The use of technology fills the gap between traditional educators and digital natives—young language learners engaged with technology on a regular basis.

Future Research

Future research in language education domain lends itself to more qualitative approaches; thus, both teachers and parents can uncover the perceptions of language learners about the use of technology in language education. Future research may investigate the impact of different types of technologies on students' language learning experience and cognitive attainment alike. It behooves researchers to juxtapose different kinds of technologies to gain a yardstick for the following empirical research.

A key focus of future research may shed light on educators' experiences about different technologies and their feasibility in terms of research when it comes to learning a new language. Exploring educators' experiences can help IT specialists and app developers cultivate a more efficient generation of technological tools that both language learners and teachers can effectively use. While our understanding of these applications is well-developed, these tools must await future empirical research to either confirm or disconfirm their usefulness in learning a language.

Conclusion

The use of technology and technological tools is not a novelty in language/teacher education. However, this view does not imply that language educators and researchers have exhausted emerging technologies in their practice. This article was an effort to fill the theory-practice praxis and increase educators' awareness by revisiting the use of technology chronologically. The authors investigated the role of technology in language education and how it increases the motivation level in language learners in different age ranges and contexts (EFL & ESL). As discussed earlier, the dominant voice in the works of Clark

(1994) and Kozma (1994) was that the novelty of technology makes a big difference, but it may not lead to learning a second language.

Having scrutinized the role of technology, the authors dived into empirical research results concerning the use of technology in language education. There is no scholarly accord about the use of technology in learning a second language. Multiple studies confirmed the usefulness of technology in learning a second language (Khoshnevisan, 2020a; Rashtchi & Khoshnevisan, 2008; Kress & Leeuwen, 2001; McKenzie & Darnell, 2004; Nincarean, Alia, Halim, & Rahman, 2013; Silva, Roberto, & Teichreib, 2013). The studies suggested that technology can serve as a catalyst in honing different skills and subskills such as listening, speaking, literacy, and vocabulary. To develop these skills, researchers employed an array of technologies and technological tools such as media, animated pedagogical agents, audiotaped dialogue journals, augmented reality (AR), AR flashcards, Mobile augmented reality (MAR), AR apps such as reader buddy, to name a few.

This article expounded both the advantages and disadvantages of technology and technological tools in language education. Consistent with the results of this article, the researchers argue that technology inherently offers promises to facilitate language education. However, these technologies may covertly impose constraints on both language educators and learners. To both capture the difficulties and uncover the limitations of technological tools, the authors proposed to conduct qualitative studies to explore the perceptions of educators, learners, and parents. Exploring the attitudes of the stakeholders is a steppingstone to developing novel and useful technologies in education. Furthermore, as the authors noted, to transcend the limitations, preservice teachers and in-service teachers need to be educated regarding the effective use of technology in classrooms. This objective can be fulfilled during teacher education courses and professional development sessions in different developmental stages of teachers.

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