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Research Article

Innovation and Implementation of Online Learning Technology in Enhancing Learning Experience Post-COVID-19

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Abstract: Recently, especially with the COVID-19 experience, the need to deploy technology in education has taken center stage. Before the pandemic, many teachers did not particularly consider the use of technology as a valuable resource for teaching and learning. However, this is rapidly beginning to change. Many languages programmed in the country are now experimenting with and utilizing technology in learning. Appropriate use of these new resources has effectively upgraded language instruction and learning. Much time, effort, and money has been spent researching and implementing new and existing technology to improve language training. Twenty-five language educators, in a focus group session conducted, feel that now is the time when the use of technological resources to enhance the learning experience will offer the highly motivated learner an efficient and flexible means of attaining basic communicative competence in language learning. The paper discusses how technology can facilitate learning in language teaching. The paper discusses the need to use some technologies for language teaching, like Zoom, Google Meet, Teams, YouTube, and Facebook, which can be easily accessible to computers, iPads, and Android devices. The research notes that with modern technology, one can learn without necessarily being in the physical classroom. Modern language teaching and learning technology makes learning easily accessible anytime and anywhere, provided internet connectivity exists.

Keywords: Computer-Assisted Language Learning (CALL); Language Learning; Technology Education; Virtual Learning Environments (VLEs).

1. Introduction

Technology has become essential in education, especially language learning [1], [2]. The rapid advancement of technology, driven by the demand during the COVID-19 pandemic, forced numerous educational institutions to adapt to technology-based learning methods. The pandemic led to school closures globally and necessitated remote learning and social distancing measures. This situation underscores the importance of technology in supporting the teaching and learning process. Technology facilitates broader access to resources and transforms teaching methods in language learning contexts, making them more interactive and student-centered [3], [4]. Therefore, technology is critical in adapting language education to a modern, digital learning environment.

Modern educational technologies—such as Computer-Assisted Language Learning (CALL) platforms, mobile applications, and interactive digital content—offer tools that allow teachers to shift from traditional, teacher-centered instruction to interactive, student-centered methodologies [2], [5]. Language learners benefit from this shift, as technology fosters individualized learning, where students can practice language skills through real-world simulations, adaptive feedback, and interactive exercises. [6]. Technology in language education promotes engagement, allowing students to learn autonomously at their own pace, which enhances motivation and language retention [7].

Despite the great potential shown by technology integration in language learning, its implementation still faces challenges. Many educators need help with

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effectively integrating technology into their curriculum. Moreover, more than simply providing access to technology is required to guarantee successful learning outcomes. Inappropriate or unfocused use of technology can diminish the effectiveness of the teaching and learning process. This challenge becomes more relevant as the shift from teacher-centered instruction to student-centered learning requires new methods and strategies to optimize the use of technology. Becker [8] noted that technology's success in language education depends on teachers' ability to integrate it meaningfully. Hennessy, Ruthven, and Brindley [9] emphasized that technology needs to be incorporated in ways that enhance rather than replicate traditional learning activities. This highlights the need for developing targeted approaches that allow educators to leverage technology to maximize learning effectiveness.

Numerous studies have examined the benefits of technology in language learning. Becker [10] emphasized that computers are crucial as instructional tools when used with adequate preparation and curricular flexibility. Clements and Sarama [11] found that appropriate technological materials can significantly benefit learners. Harmer and Cates [12] demonstrated that computer-based activities enhance cooperative learning by allowing students to work together on interactive tasks. Hennessy, Ruthven, and Brindley [9] investigated technology integration in teaching, highlighting that technology can reshape traditional classroom activities, making them more efficient and engaging. However, these studies also highlight gaps in integrating technology efficiently and sustainably to maximize its educational benefits. For instance, more exploration is needed to determine the best practices for blending technology with traditional pedagogies to support meaningful language acquisition.

This research is necessary because it seeks to provide a deeper understanding of technology's application in post-pandemic language learning. The findings are expected to offer practical guidance for educators on effectively leveraging technology in the teaching process. Beyond practical implications, this study aims to contribute theoretically by developing technology-based learning methods that are more inclusive and adaptable to diverse learner needs, potentially influencing future educational policies and instructional design. As technology becomes increasingly integral in education, this research can serve as a valuable resource for educators aiming to foster a more dynamic and responsive learning environment.

Despite numerous studies highlighting the benefits of technology in language education, gaps still need to be found in understanding how to integrate it seamlessly across varied language learning contexts. Moreover, there has been limited exploration of technology's impact in post-pandemic environments, particularly in supporting the transition from traditional teaching methods to technology-enhanced approaches. Existing research does not sufficiently address how technology can bridge instructional challenges faced by educators and significantly ensure equitable access to quality education as the demands on digital literacy and resources increase.

This study aims to explore the application of technology in language learning through a Computer-Assisted Language Learning (CALL) approach, focusing on identifying effective strategies to maximize the benefits of technology in language education, especially in a post-pandemic context. Consequently, the research seeks to provide new insights into how technology can support sustainable language teaching and learning practices, offering a framework for integrating technology in ways that are responsive to the evolving needs of educators and learners alike.

2. Literature Review

2.1. Impact of Technology on Language Education

Integrating technology into the language learning process has significantly reshaped educational practices, offering new opportunities for teachers and learners. Costley [13] and Murphy [14] assert that technology is an effective tool for language learning and enables greater engagement and interactivity. Teachers who model the use of technology in the classroom can guide students to incorporate digital tools into their learning processes, leading to improved language skills.

One of the core advantages of technology is its ability to foster cooperation among learners. Keser, Huseyin, and Ozdamli [15] emphasized that technology facilitates collaborative learning, where students can create tasks and exchange feedback. This collaborative environment nurtures peer-to-peer learning, where students learn from their instructors and one another, thus deepening their understanding of language concepts.

Furthermore, technology is crucial in establishing local and global learning networks. Bransford, Brown, and Cocking [16] emphasize that technology enables teachers and students to connect with international communities, expanding access to various language experiences. These connections foster a rich and immersive learning environment where learners can practice authentic language with native speakers while gaining valuable cultural insights that significantly enhance their language skills. By facilitating these interactions, technology enriches the educational experience. It cultivates a deeper understanding of the language in its cultural context, ultimately promoting more effective language acquisition and greater global awareness among learners.

2.2. Technology-Enhanced Learning Environments

Technology integration has led to a paradigm shift in teaching and learning methods from traditional lecture-based classrooms to more interactive, student-centered environments. Conventional teaching models, which often rely on the teacher as the central figure in the classroom, are increasingly being replaced by technology-enhanced methods that place the learner at the center of the educational process [17]. A well-planned classroom setting, supported by technology, promotes a more efficient and personalized learning experience [18]. Technology enables learners to access a broader range of resources, engage in interactive activities, and receive immediate feedback, contributing to more effective language acquisition.

Multimedia, including text, video, and audio, is crucial in modern language classrooms. Dawson et al. [19] and Tsou et al. [20] emphasized the importance of multimedia tools in supporting language learners. These tools help familiarize learners with vocabulary, grammar, and language structures, making lessons more engaging and memorable. Moreover, technology allows learners to use authentic language by accessing online content such as news articles, videos, and podcasts in the target language. Such exposure enriches their understanding of language in real-world contexts, which is crucial for developing fluency.

By moving beyond traditional teaching methods, technology creates an active, dynamic classroom environment where learners are empowered to take ownership of their learning. When learners use technology tools such as computers and the Internet, they become active participants, engaging in tasks that are meaningful and aligned with real-world language use. This shift enhances their critical thinking and problem-solving skills, which are essential for mastering a second language [21].

2.3. Autonomy, Motivation, and Social Interaction

A key benefit of technology in language education is its ability to promote learner autonomy and motivation. As Hennessy [22] points out, technology encourages learners to take responsibility for their learning. With digital tools such as online language learning platforms, educational apps, and discussion forums, students can access resources anytime, anywhere, making learning at their own pace easier. Lee et al. [23] Computer-Assisted Language Learning (CALL) improves language skills and boosts learners' self-confidence by offering them greater control over their learning process.

Costley (2014) further emphasizes that ICT tools encourage active participation, where learners are engaged in discussions, problem-solving, and decision-making. This active participation is vital to improving retention and language acquisition. Furthermore, technology helps learners engage in meaningful learning through various forms of interaction, including synchronous discussions on platforms like Zoom and asynchronous communication via email and social media. These interactions improve language skills and enhance critical thinking by requiring learners to engage with diverse perspectives and ideas.

Moreover, the use of technology significantly enhances social interaction among learners. Warschauer [24] Described two approaches to integrating technology into the classroom: the cognitive approach, which focuses on language acquisition through increased exposure, and the social approach, which emphasizes authentic communication and collaboration. Both approaches benefit learners by fostering social interaction, essential for developing real-life language skills. For instance, computer-based communication tools such as discussion boards, video conferencing, and instant messaging create opportunities for learners to engage in collaborative tasks, promoting linguistic and social development. Studies by Eaton [25] and Lei et al. [26] underscore these tools' value in providing learners equal opportunities to participate in conversations and access authentic language materials.

Technology increases motivation and promotes deeper engagement in the learning process. Learners reported that technology made learning more enjoyable and interactive, which led to increased social interactions and better overall learning outcomes [27]–[29]. This research further supports the idea that technology creates a positive and motivating environment that encourages students to practice language skills in real-world contexts when incorporated effectively.

3. Material and Methods

3.1. Participants

The study involved twenty-five active English language teachers from Plateau State Polytechnic, Barkin-Ladi, Nigeria. Participants were purposefully selected to ensure they had relevant experience with digital teaching tools and techniques since the onset of the COVID-19 pandemic. By selecting participants familiar with technological adaptations in education, the study aimed to explore insights into both the benefits and challenges of using computer technology in language instruction. Purposeful sampling in qualitative research supports a focused understanding of the research topic, enabling in-depth exploration of participants' experiences and perspectives [30], [31].

3.2. Procedures

The focus group discussion was held via WhatsApp for one hour, providing a convenient and familiar platform for participants, which is increasingly utilized in qualitative studies due to its accessibility and flexibility. Before the session, participants were briefed on the study's objectives and gave informed consent. The researchers moderated the discussion using a semi-structured guide, ensuring the conversation stayed on a topic while allowing flexibility for participants to express diverse perspectives. A balanced, open atmosphere was maintained to encourage active participation and varied viewpoints. The role of the moderator in guiding virtual discussions has become central in qualitative research, as it ensures effective engagement in online platforms where social cues and non-verbal communication may be limited [32], [33].

3.3. Discussion Guide

A semi-structured guide was developed to facilitate the focus group discussion, with open-ended questions designed to explore the integration of computer technology in English language teaching in the post-COVID-19 era. The guide aimed to capture teachers' experiences with digital tools, focusing on the challenges and benefits they encountered in adapting to online and blended learning environments. Questions prompted discussions on the types of technology used, its impact on student engagement, and technology's long-term potential in education. The open-ended format allowed participants to provide detailed insights into the practicalities and outcomes of incorporating technology in their teaching practices while highlighting educators' diverse perspectives navigating the post-pandemic shift in education.

By adopting a semi-structured approach, the guide ensured a focused yet flexible conversation, enabling moderators to explore specific themes while allowing room for participants to express their unique experiences. This method effectively captures rich, qualitative data, comprehensively understanding the topic [34]–[36].

3.4. Data Collection

To collect data for this study, an online focus group discussion was conducted via WhatsApp, lasting one hour. The discussion involved twenty-five English-speaking teachers from Plateau State Polytechnic, Barkin-Ladi, selected based on their teaching experience and involvement in post-COVID-19 practices incorporating technology. The discussion focused on the role of computer technology in English language teaching and learning in a post-pandemic context. The researchers acted as moderators, facilitating engagement and ensuring participants' responses provided meaningful data for analysis.

With participants' consent, the focus group was audio-recorded to capture all responses accurately. The researchers transcribed the recordings verbatim shortly after the discussion, preserving the authenticity of the participants' perspectives. Transcription is essential in qualitative research, enabling systematic data analysis while maintaining the integrity of participants' original statements [37].

3.5. Data Analysis

Thematic analysis was utilized to analyze the data, following a systematic process of identifying and coding recurrent themes within the transcripts. This approach enabled the researchers to categorize the data into key themes, further divided into opportunities (enhanced student engagement, greater flexibility in teaching) and challenges (resource constraints, connectivity issues). The iterative coding process facilitated the refinement of these themes, providing a deeper, more nuanced understanding of the participants' experiences with technology in English language teaching.

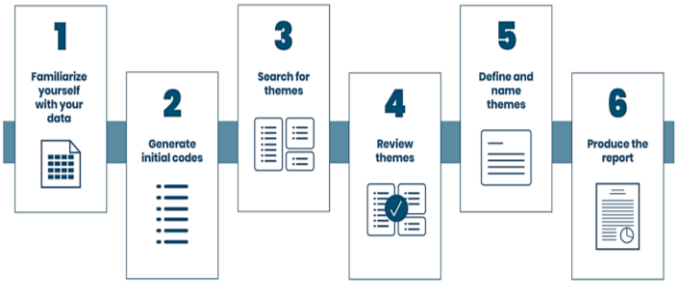

Figure 1. Phases of Thematic Analysis [38].

Thematic analysis is a well-established method in qualitative research, widely recognized for its flexibility and ability to uncover patterns within complex data sets [39]. It offers a structured yet adaptable approach to data interpretation, allowing researchers to move beyond surface-level observations and explore the underlying meanings within participants' responses. This method is beneficial for exploring diverse perspectives and capturing the richness of participants' lived experiences, as seen in the context of post-pandemic teaching practices. By identifying key themes, thematic analysis helped the researchers gain insights into the positive impacts and barriers associated with integrating computer technology into education.

4. Result and Discussion

4.1. The Role of Online Learning Tools in Language Teaching

Online learning tools have transformed language education by providing flexible, accessible, and interactive environments for teachers and learners. These tools have proven especially vital during disruption, such as the COVID-19 pandemic, ensuring continuity in education when physical interactions are constrained. Integrating technology into language teaching offers numerous opportunities while posing challenges that require strategic solutions.

One of the most significant advantages of online learning tools is their ability to provide flexibility. Learners can access course materials and complete tasks conveniently, making education adaptable to diverse schedules and needs [40]. This flexibility is supported by WhatsApp, Zoom, Microsoft Teams, Google Meet, and Moodle, which enable synchronous and asynchronous communication. Teachers can share resources, grade assignments, and provide real-time feedback through these platforms, fostering an environment accommodating learners' paces and preferences [41], [42].

Audio and video conferencing technologies have further enriched the learning experience. Audio conferencing facilitates two-way communication between teachers and students, allowing real-time discussions and instant clarification of doubts. Video conferencing adds a visual dimension, enabling learners to observe non-verbal cues, such as facial expressions and gestures, which are crucial in language acquisition. Platforms like Skype, Zoom, and Google Meet offer features like screen sharing and breakout rooms, enhancing interactive learning. The research underscores the value of these technologies in building learners' confidence and engagement, particularly in speaking and listening tasks [43], [44].

The internet itself serves as an expansive resource for language learning. Many websites and digital libraries provide tailored content to enhance reading, writing, listening, and speaking skills [45]. For instance, platforms like LingQ and News in Levels offer graded reading materials that improve vocabulary and comprehension. Tools such as Grammarly and ProWritingAid help learners refine their grammar and writing proficiency. Meanwhile, multimedia resources like TED Talks and BBC Learning English expose learners to authentic language use, enriching their listening and pronunciation skills. The vast availability of these resources aligns with the democratizing potential of the Internet, which breaks barriers to high-quality education [46], [47].

Virtual Learning Environments (VLEs) represent a more structured approach to online education. These platforms, including Moodle and Blackboard, allow institutions to design and deliver courses that are accessible both on and off campus. VLEs provide collaboration, discussion, and assessment tools, making them indispensable for hybrid and distance learning models. By enabling students to study remotely, VLEs bridge geographic and logistical gaps, making education accessible to those who might otherwise be excluded [48].

Beyond individual learning, technology facilitates intercultural and community-based education. Language learners can connect with peers worldwide through platforms like HelloTalk and Tandem, enabling authentic exchanges beyond textbooks. These interactions provide insights into cultural nuances and real-world language use, fostering linguistic and cultural proficiency. Additionally, creating virtual learning communities encourages collaborative problem-solving and shared knowledge generation, reflecting the social nature of effective learning [49].

Despite its advantages, integrating technology into language teaching is challenging. Access to reliable internet and digital devices remains unequal, particularly in developing regions [50]. This digital divide limits the reach of online tools, exacerbating educational inequalities. Furthermore, many teachers and students need more digital literacy to navigate these tools effectively, hindering their adoption and impact. Distractions from social media and other online activities also pose significant challenges, reducing learners' focus and productivity [51]. Additionally, infrastructural limitations, such as unstable power supplies and poor internet connectivity, further impede the success of online learning in many areas.

Another barrier is the financial cost of acquiring digital devices and maintaining internet connectivity, particularly in low-income communities. Educational institutions and policymakers must address these issues to ensure that the benefits of technology are equitably distributed. Training programs for teachers and students are essential to building the digital competencies required to maximize the potential of these tools. Subsidizing technology costs and investing in infrastructure will also help bridge the digital divide, making online education more inclusive [52].

While these challenges are substantial, they can be mitigated through a blended learning approach that combines the strengths of online tools with traditional in-person teaching [53]. This hybrid model allows learners to benefit from the flexibility of technology while maintaining the personal interactions and hands-on activities often lost in entirely virtual environments. Institutions must also implement systems to monitor learners' engagement and

provide timely support to address challenges such as distractions or skill gaps [54].

4.2. The Use of Technology in Language Teaching

Technology integration in language teaching has significantly impacted how teachers and students interact with learning materials. Technology enhances access to educational resources and transforms classroom dynamics, offering a more flexible, personalized, and effective learning approach. However, despite its numerous advantages, implementing technology in language teaching is challenging.

Technology provides unprecedented accessibility. Students and teachers can access educational materials anytime and anywhere through e-dictionaries, e-libraries, online learning platforms, and other digital resources. Technology bridges geographical gaps, enabling language learning across borders without physical limitations. This is particularly relevant in globalization, where cross-cultural language skills are increasingly in demand [55].

Flexibility in learning time and place is another significant advantage. Platforms such as Duolingo, Rosetta Stone, and other AI-based applications allow students to learn independently. According to Stockwell [56], this flexibility boosts students' motivation to learn, especially those with busy schedules or who live in remote areas. Technology also offers instant feedback, accelerating the learning process. For example, platforms like Grammarly and Microsoft Editor enable students to immediately identify grammatical or structural errors, allowing them to learn from their mistakes in real-time.

Another advantage is the ability to repeat materials as often as needed. This repetition is crucial for language mastery, especially for reinforcing long-term memory, as Baddeley [57] explained in his working memory theory. Moreover, the 24/7 availability of the Internet offers durability unmatched by traditional methods. Technology also supports multimodal learning, where various media (visual, audio, interactive) are simultaneously used to enhance students' cognitive engagement [58]–[60].

However, technology adoption in language teaching faces several challenges, particularly in developing countries like Nigeria. One of the main obstacles is cost. Acquiring hardware such as laptops, tablets, or smartphones and ensuring stable internet connectivity requires substantial investment. According to Selwyn [61], the digital divide often exacerbates inequalities in educational access, particularly among lower socioeconomic groups.

Another challenge is technological literacy. Many students and teachers need to become more familiar with modern technological tools, making it challenging to adopt technology-based learning methods. Low digital literacy is a significant barrier, especially in regions with limited access to technological education [62]. Digital distractions are also a substantial issue in technology-based learning. Social media platforms like Facebook, WhatsApp, and Instagram often disrupt students' focus during learning sessions. According to Junco [63], excessive use of social media can lower academic productivity and lead to declining educational performance.

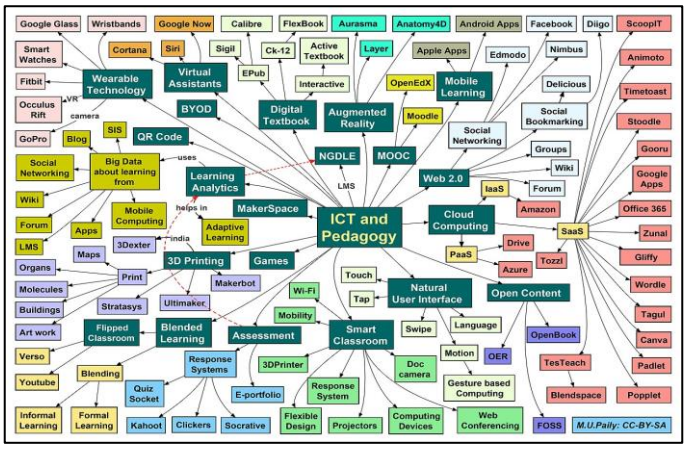

Figure 2. A Mind Map Educational Technology [64].

In countries like Nigeria, inadequate infrastructure, especially electricity supply, poses a severe challenge. An unstable electricity supply hinders access to technology and the Internet, making it difficult for students and teachers to leverage digital tools [65]. Additionally, adopting technology can reduce the need for specific roles in the education sector. Automating aspects of learning, such as task correction and material management, may replace some teaching roles with software, potentially leading to unemployment in the education sector [66].

Technology in language teaching holds significant potential to improve the quality of education. Benefits such as accessibility, flexibility, instant feedback, and multimodal learning have proven effective in enhancing students' motivation and learning outcomes. However, strategic policies and investments must address cost, technological literacy, digital distractions, and inadequate infrastructure.

5. Conclusion and Recommendations

Technologies are revolutionizing how people learn, offering innovative alternatives to traditional, physical classrooms. With technology, learners can access education anytime and anywhere, making learning more flexible, convenient, and accessible. It simplifies the educational process by providing learners with materials

and resources. However, despite its potential, integrating technology alone does not guarantee effective teaching and learning outcomes. The findings of this study highlight that to fulfill technology's potential in education, teachers must recognize its benefits in enhancing learning, underscoring the need for targeted support and comprehensive training for practical integration into language teaching.

Technology plays a pivotal role in language learning, allowing students to learn at their own pace, fostering self-awareness, and maintaining meaningful interaction with teachers, significantly boosting learners' motivation to master language skills. Additionally, technology enhances creativity by providing engaging alternatives to traditional methods. The study affirms that when effectively utilized, technology strengthens the interaction between teachers and students, facilitates the exchange of comprehensible input and output, and promotes critical thinking skills. Ultimately, this paper demonstrates that technology transforms the educational experience for teachers and learners, creating a dynamic environment where learners thrive and teachers are empowered to deliver impactful instruction.

Several vital recommendations arise from the study's results to enhance the effective integration of technology in teaching and learning. Educational institutions must ensure adequate infrastructure, skilled human resources, and reliable connectivity, essential for the seamless integration of Information and Communication Technology (ICT). They encourage students to use personal devices, such as Android mobile phones, as learning tools can boost engagement and develop critical digital literacy skills. Furthermore, prioritizing reliable internet access and consistent power supply is vital for uninterrupted access to technological resources. By addressing these infrastructural needs, institutions can create an environment that enhances learning outcomes and fosters a more engaging and inclusive educational experience, ultimately enriching the educational landscape and preparing students for a digitally interconnected future.

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