

Pronunciation instruction in digital EFL programs at Indonesian university: Pedagogical challenges and opportunities

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ABSTRACT

The use of digital technology has significantly transformed traditional pedagogical practice for pronunciation instruction. Numerous studies have explored the positive and negative impact of digital tools in pronunciation instruction, yet only a limited number of studies emphasize the pedagogical challenges and opportunities of digital devices in pronunciation instruction, particularly within Indonesian higher education level. To fill this gap, this qualitative study investigates the pedagogical challenges and opportunities of pronunciation instruction in digital EFL programs at Indonesian university. Data collection was conducted through semi-structured interviews and class observations involving 29 participants, including 2 EFL lecturers and 27 university students. Findings reveal that while digital platforms such as mobile apps, websites, YouTube, LMS, and AI-powered platforms facilitate increased learner autonomy and provide authentic pronunciation models, barriers persist in the form of limited digital literacy among lecturers, inadequate institutional support, and infrastructural constraints. Despite these challenges, lecturers and students generally hold positive attitudes toward technology integration, recognizing its potential to enhance the process of pronunciation teaching and learning. The study underscores the need for targeted professional development and greater institutional investment to fully leverage digital technologies in pronunciation instruction. Implications for policy and pedagogy in similar developing contexts are discussed.

Keywords: digital tools; EFL learner; pronunciation instruction

INTRODUCTION

The integration of digital technology into language education has transformed traditional pedagogical practices, particularly in the field of English pronunciation instruction. As English continues to solidify its role as a global lingua franca (Pennington & Rogerson-Revell, 2019), the ability to communicate intelligibly has become a crucial

component of language proficiency (Pennington & Rogerson-Revell, 2019; Saldiraner & Cinkara, 2021). This intelligibility might be achieved if the English learners could appropriately employ both segmental and prosodic features in their speech. The mastery of these complex features, however, requires learners to learn and to practice their pronunciation skills persistently and continuously at anytime and anywhere (Celce-Murcia et al., 2010; Rogers, 2014). Thus, they need more learning flexibilities to practice their pronunciation skills in which traditional learning strategies might not cover. In this case, the roles of technology cannot be avoided during the process of pronunciation instruction.

Within the Indonesian higher education context, where English is taught as a foreign language or EFL, pronunciation remains one of the most challenging yet essential aspects of language learning. The different sound system between Indonesian and English becomes the primary challenges for Indonesian EFL learners (Madya, 2000; Khoiriyah et al., 2025). English pronunciation requires strong memorization skills because there is little consistency between English sounds and the letters that represent them. Meanwhile, Indonesian is a phonetic language in which there is close relation between sounds and their symbols. Another challenge is that Indonesian is a syllable-timed language (Lasut, 2015), but English is a stress-timed language (Harron et al., 2016; MacKay, 2014). Moreover, all Indonesian vowels are generally produced in a similar manner, yet English distinguishes between short and long vowels. When Indonesian EFL learners produce those sounds differently, the meaning will change significantly. This potentially hinders the speakers' communicative needs during the process of communication. Many studies indicate that communication can break down when a speaker mispronounces either consonant or vowel sounds (Jenkins, 2000, 2002; Pennington & Rogerson-Revell, 2019). To make things more complicated, the presence of homophones, homographs, and silent letters further increases the difficulty of pronunciation mastery for Indonesian EFL learners (Dardjowidjojo, 2009).

Despite its importance, pronunciation has often been side-lined as a crucial subject in Indonesian higher education. It is often marginalized in formal curricula, receiving less instructional time and pedagogical focus compared to grammar, vocabulary, and reading skills (Benzies, 2016; Derwing, 2010; Farhat & Dzakiria, 2017). This is because of some reasons. First, due to a narrow perspective of communicative language teaching (CLT), the curriculum designers in higher education either integrate pronunciation into other courses or leave it out of the curriculum altogether (Moedjito, 2009; Moedjito 2016; Moedjito et al., 2019). Second, many lecturers do not have sufficient time or specialized training to teach pronunciation (Farhat & Dzakiria, 2017; Harmer, 2001; Hayati, 2010). As a result, the lecturers are doubtful and not confident enough to teach English pronunciation (Harmer, 1998; Pokrivčáková, 2015; Gilakjani & Rahimy, 2020). Given these persistent curricular and pedagogical constraints, there is a pressing need for alternative approaches that can support pronunciation instruction without increasing lecturers' workload or requiring extensive specialist expertise. In this context, the use of digital devices offers a potential means to support pronunciation instruction by compensating for limited instructional time and lecturers' lack of confidence in teaching pronunciation.

The advent of digital devices ranging from mobile applications and speech analysis software to virtual learning environments offers new pathways for enhancing pronunciation instruction in Indonesian higher education. These tools provide opportunities for personalized, interactive, and feedback-rich learning experiences that

can potentially overcome traditional classroom constraints such as limited instructional time, lack of native-speaker models, and insufficient teacher training in phonetics (Gilakjani & Sabouri, 2013; Gilakjani & Rahimy, 2020). Learners can independently learn phonetic symbols while practicing their pronunciation skills, both segmental and prosodic features. They may use the digital devices such as mobile-phones which they bring everywhere to search mobile applications or pronunciation websites. This is a promising learning pathway in pronunciation instruction as learners might determine their best strategies to learn. However, the implementation of digital pronunciation instruction is not without challenges. Issues related to technological access, digital literacy, pedagogical alignment, and institutional support continue to hinder its effective integration into EFL programs across Indonesian universities (Putri, 2025).

Given the growing reliance on digital tools for pronunciation instruction, it is essential to situate these developments within a broader pedagogical framework particularly Mobile-Assisted Language Learning (MALL). As mobile devices increasingly serve as accessible and flexible learning platforms for Indonesian EFL learners, MALL provides a theoretical foundation for understanding how mobile technologies support autonomous, context-aware, and continuous pronunciation practice (Uwizeyimana, 2018). By framing the use of mobile applications and other portable digital resources within MALL principles such as portability, ubiquity, personalization, spontaneity and immediacy, authenticity and context awareness, social connectivity, and learner autonomy (Cacchione et al., 2015; Chapelle, 2007; Chen, 2013), Indonesian EFL lecturers can better evaluate their pedagogical value, address existing challenges, and design pronunciation instruction that fully capitalizes on the unique affordances of mobile learning environments.

There have been various studies discussed the use of mobile devices for pronunciation instruction in two different perspectives. Some studies revealed that digital tools positively influence pronunciation instruction by offering learners individualized and immediate feedback. It also promotes greater autonomy among EFL learners as they can learn and practice English pronunciation independently (Gilakjani & Rahimy, 2019; Mehrpour et al., 2016; Gilakjani & Rahimy, 2020; Gilakjani & Sabouri, 2017; Rachmawati, 2016). In addition, pronunciation digital tools provide access to rich learning materials, diverse activities, and engaging pronunciation practice (Adityarini et al., 2022; Carley, 2019; Putri, 2025). On the contrary, some other studies stated that the use of digital devices still presents many negative influences in actual implementation. The digital tools cannot offer EFL learners fully accurate or detailed feedback, nor can it reliably diagnose issues in producing segmental or prosodic features (Levis, 2018; Levis & LeVelle, 2012). The provided feedback given by the pronunciation digital tools is limited to simple responses such as "right," "wrong," or "try again" which is not particularly useful in a practical sense (Nguyen & Hung, 2021).

Although many studies highlight the different perspectives on the use of digital devices for pronunciation instruction, very few studies published data on the pedagogical challenges and opportunities on the use of digital tools for pronunciation instruction within Indonesian higher education (Adityarini et al., 2022; Putri, 2025). Therefore, this research aims to explore the multifaceted pedagogical challenges and emerging opportunities of pronunciation instruction in digital contexts within Indonesian higher education. Drawing on current empirical studies, technological advancements, and pedagogical frameworks, the study investigates how digital tools are being utilized, perceived, and adapted by educators and learners. In more detail, the research

questions are formulated as follows. This study is guided by the following research questions:

- 1) How do EFL lecturers and university students in Indonesian higher education perceive the use of digital tools for pronunciation instruction?
- 2) What types of digital technologies are being used to support pronunciation learning and teaching?
- 3) What are the main challenges faced by lecturers and students in implementing digital tools for pronunciation instruction?
- 4) What opportunities do digital platforms offer to enhance pronunciation instruction in Indonesian university settings, as perceived by the participants?

By addressing both systemic and practical dimensions, the paper contributes to a more nuanced understanding of how pronunciation teaching can evolve in line with digital innovation and educational policy in Indonesian higher education.

METHODS

Research design

This current study employed a qualitative research design to investigate the pedagogical challenges and opportunities which were related to pronunciation instruction in EFL programs within Indonesian higher education. This research design was selected to gain an in-depth understanding of participants lived experiences, perceptions, and practices related to the integration of digital tools for pronunciation teaching and learning.

Research contexts

This research was conducted at PGRI Delta University. This university is located at Kemiri Street-Sidoarjo-East Java-Indonesia. It consists of eight study programs, and one of them is English education study program where the research was conducted. This study program provides an English pronunciation course for the first-year students in the curriculum. Therefore, the participants selected in this research were the first semester students taking English pronunciation course and the lecturers.

Participants

A total of 29 participants were involved in the study, comprising both 2 EFL lecturers and 27 university students from PGRI Delta University. The lecturers were purposefully selected based on their active involvement in teaching English pronunciation and their use of digital tools in the classroom. This criterion ensured that the study could capture informed perspectives on the integration of technology in pronunciation instruction and the challenges and strategies associated with it. Here are some characteristics of the research participants.

A. Lecturers

Characteristics	Lecturer A	Lecturer B
Gender	Female	Male
Age	48 years old	42 years old
Teaching Experiences	14 years	11 years

B. Students

The students observed were selected from the first semester students who had direct experience with using digital tools such as mobile applications, artificial intelligence (AI), video conferencing platforms such as Zoom, and Learning Management Systems (LMS) for pronunciation instruction or learning. This selection strategy ensured the inclusion of participants with relevant and diverse insights into the digital learning environment. The students' English competency (speaking, listening, writing, and reading skills) is mostly in the beginner until intermediate level. The students' competency was revealed when they took the entrance test.

Data collection

Data were collected through two primary qualitative methods: semi-structured interviews and classroom observations.

1) Interviews

The interviews were done with both lecturers and students to capture their experiences, perceptions, and attitudes regarding the use of digital tools in pronunciation instruction. The semi-structured format allowed for open-ended responses while maintaining a consistent thematic focus across participants.

2) Observations

Classroom observations were conducted in both virtual and face-to-face instructional settings where digital tools were systematically integrated into pronunciation instruction. In virtual classrooms, observations took place during synchronous online sessions conducted via learning management systems and video-conferencing platforms, while in physical classrooms, observations focused on lessons that incorporated digital resources such as pronunciation software, mobile applications, or multimedia materials.

The observations followed a non-participant approach, allowing the researchers to document instructional practices without interfering with classroom activities. An observation protocol was used to guide data collection, focusing on four key dimensions: (1) instructional strategies employed by lecturers for teaching pronunciation using digital tools, (2) levels and forms of learner engagement during pronunciation activities, (3) patterns of interaction between learners, lecturers, and digital resources, and (4) contextual factors influencing implementation, including institutional support, classroom infrastructure, and time allocation.

Field notes were taken during each session to capture instructional sequences,

lecturer explanations, student responses, and notable instances of effective or problematic technology use. In virtual classes, screen-based observations enabled detailed examination of tool usage and interaction patterns, while in physical classrooms, observations emphasized how digital tools were blended with traditional instruction. To enhance trustworthiness, observations were conducted across multiple sessions and courses, allowing for comparison and identification of recurring practices and challenges.

All interviews and observations were conducted over a period of two months. The interviews were recorded with participant consent and transcribed. Field notes were taken during observations to support data triangulation and enhance the validity of findings.

Data analysis

The data were analyzed by using Miles and Huberman (Miles et al., 2018) model, consisting of three related stages: data condensation, data presentation, and data verification. Transcripts and observation notes were read repeatedly and coded manually. Emerging categories were then grouped into broader themes that reflected both the pedagogical challenges and opportunities in integrating mobile and digital technologies. This iterative process allowed for a nuanced interpretation of the data in line with the research objectives.

RESULTS

The results of this study are presented and systematically elaborated in accordance with the established research questions.

- 1) How do EFL lecturers and university students in Indonesian higher education perceive the use of digital tools for pronunciation instruction?

Based on the results of interview and classroom observation, it was revealed that both lecturers and students showed a positive perception towards digital tools as valuable resources for pronunciation instruction. A dominant theme that emerged among EFL lecturers is the belief that digital tools such as mobile pronunciation applications, learning management system, and AI-supported speech analysis enhance students' exposure to authentic spoken models. The lecturers emphasized that these tools offer "consistent access to native-like input" and allow students to practice pronunciation beyond classroom time, thus addressing limitations of traditional face-to-face instruction. Lecturers also highlighted increased learner autonomy as a key benefit, noting that digital platforms enable individualized practice and immediate feedback, which are difficult to provide in large classes.

Extract 1

Teaching pronunciation course using digital tools helps me a lot during teaching and learning process. These digital technologies provide accurate English sound productions which I could not do as I am a Javanese speaker. I can hardly pronounce the English consonants particularly the sounds like / θ / and / ð /. By using digital platforms in pronunciation instruction, the students can get much clearer explanation on how to produce English sounds (Lecturer A).

Extract 2

I think pronunciation websites such as www.manythings.org, www.rongchang.com, and www.engfluent.com really help my students to practice pronunciation skills. They can practice autonomously, and they don't rely on the presence of the lecturer. When the students come to my class, I just need to check their pronunciation skills. I can also download the materials from websites and save them in my LMS. Thus, the absent students could catch up the materials through LMS (Lecturer B).

Extract 3

Digital platforms for pronunciation instruction facilitate me to teach huge classroom. I will run out my voice when teaching them without using technology. My voice cannot even be heard by students sitting at the back row. However, with pronunciation website I can maximize in delivering materials to my students (Lecturer A).

Extract 4

Digital platforms such as website and applications provide my students with authentic learning materials. They may access native-input from the used digital platforms. This facilitates me to teach them the difficult sounds and prosodic features. (Lecturer B)

For EFL higher education students, they also expressed similarly positive attitudes, reporting that digital tools help them become more confident and independent learners. Many students described the tools as "easy to use," "motivating," and "less intimidating" compared to practicing aloud in front of peers. In practice, students engaged with the tools by listening to model pronunciations, recording their own speech, and comparing their pronunciation with the examples provided. This process enabled them to identify errors, self-correct, and track their progress, demonstrating that their positive attitudes were accompanied by actual use and learning benefits. Moreover, they also noted that digital tools reduce anxiety by allowing private rehearsal before in-class pronunciation tasks. However, students acknowledged some challenges, including inconsistent internet connectivity and the tendency of automated feedback to misinterpret local accents. The inconsistent internet connectivity usually happened because the network congestion during peak usage hours. Despite these issues, most students considered digital tools an essential complement to lecturer explanations and in-person modeling.

Extract 1

I feel more confident, sir because I don't feel shy to practice my skills in front of my friends. I can learn by myself by playing again and again. If I feel doubtful on how to produce certain English sounds, phrases, or sentences, I can listen to the pronunciation websites. This is really helpful for me (Student 1).

Extract 2

Learning Pronunciation through digital devices is really motivating. I'm so happy because I can complete the explanation from my lecturer with the source from the website. My lecturer usually asks us to open

www.manythings.org and pronunciation application to add some more exercises for practicing. Learning pronunciation can be more fun as there are also some game provided in the website (Student 2).

Extract 3

I sometimes cannot catch what my lecturer pronounces about certain English sounds, words, and sentences. When I want to ask my lecturer, I am shy. If there is no the digital tool, I'm really confused about the materials. This digital tool allows me to learn independently at home (Student 3).

The results of interview and classroom observation showed a strong agreement that digital tools do not replace the role of the lecturer, but rather enhance instructional effectiveness when they are integrated pedagogically. Lecturers stressed the importance of guiding students on how to evaluate automated feedback critically, while students stated that explanations from lecturers help them understand the rationale behind pronunciation corrections. Collectively, the data analysis suggested that digital tools are perceived as pedagogically beneficial, practical, and supportive of learner motivation, provided that their use is accompanied by clear instructional scaffolding. The shared positive attitudes among lecturers and students indicate a readiness within Indonesian higher education to further integrate digital pronunciation technologies into EFL curricula.

2) What types of digital technologies are being used to support pronunciation learning and teaching?

The results of interview and classroom observation showed some digital technologies used to enhance students' pronunciation skills. In general, the lecturers had the students open pronunciation websites or pronunciation application during the learning process. This was intended to help students learn and practice pronunciation independently. The most common pronunciation websites used were www.manythings.org, www.rong-chang.com, and www.engfluent.com. The use of these websites was not once in a day, yet every other three or four days. This teaching strategy was used to create fun English learning atmosphere so that the student can avoid learning boredom.

Extract 1

I usually use pronunciation websites such as www.manythings.org, www.rong-chang.com, and www.engfluent.com. I don't use these websites once in a day as there are many materials and exercises which can't be finished in one day. I need to select the relevant learning materials with the topic being discussed (Lecturer B).

Extract 2

When my students get bored with the contents of the website, I use another one. This is important to be implemented in my class because the students get bored easily when learning without having a pronunciation game. They keep on asking to play the game to avoid learning boredom (Lecturer B).

The other lecturer used pronunciation application such as pronunciation power and YouTube. These digital tools were used interchangeably. In addition, to enrich students' comprehension on the materials conveyed, Artificial intelligence (AI) was used to provide the video of human organ of speech and the way how sounds are produced. Moreover, the lecturer saved the learning materials either text, video, or audio in Learning Management System (LMS).

Extract 1

I use some digital platforms in conveying my materials both pronunciation applications and You Tube. I usually utilize Pronunciation Power applications as this application provide not only the exercises but also pronunciation game. To add students' knowledge and skills, I also use AI to give a virtual human figure in producing English sounds (Lecturer A).

Extract 2

To facilitate me in managing my teaching materials, I save all materials in my Learning Management System as it helps not only me as a lecturer but also the students who are not present to access the materials (Lecturer A).

3) What are the main challenges faced by lecturers and students in implementing digital tools for pronunciation instruction?

The data revealed that both lecturers and students encountered several interrelated challenges when integrating digital tools into pronunciation instruction. For lecturers, the primary difficulties stem from limited technological expertise, which often restricts their ability to fully exploit the pedagogical potential of digital applications designed for phonetic training. They reported that these difficulties due to the habits or preparation on how to operate the pronunciation platforms. In addition, the lack of structured institutional support particularly the insufficient training and inadequate access to reliable technological infrastructure, leading to inconsistent implementation across courses. This might be said that the lecturers faced challenges in adapting traditional pronunciation pedagogy to digital formats, particularly in designing activities that balance automated feedback with meaningful communicative practice.

Extract 1

I need to learn and explore more on how to operate the digital tools before I use it in the classroom. If I apply the application directly, it will make me in trouble during the instructional process. I need to join more workshop on digital pronunciation devices (Lecturer A).

Extract 2

Technology really helps me in running my job, yet I become dependent on internet connection. When the internet connection is poor, my instructional design will ruin. This waste my time and the effectiveness of my teaching process (Lecturer A).

Extract 3

I need to search various references particularly on how to activate and invite

my students to use the practiced phrases or sentences in real-life context. The digital tools only give examples on how to produce certain English sounds, phrases, and sentences, yet lecturers are required to provide more context to use the sentences (Lecturer B)

From the students' perspective, the most significant challenges involved unequal access to digital devices, unstable internet connectivity, and varying degrees of digital literacy (particularly for students who are from very remote area). It affected their ability to engage consistently with pronunciation tools. Students also expressed concerns about the impersonality of automated feedback, noting that while digital tools provided immediate corrective input, they often lacked nuanced explanations comparable to instructor-led guidance. Furthermore, decreased opportunities for real-time spoken interaction in digital environments limited learners' confidence and reduced the authenticity of pronunciation practice.

Extract 1

I am actually happy with the use of digital tools to learn pronunciation. However, the digital tools require me to spend some extra money, for example to buy internet quota. Otherwise, I cannot learn and catch up the materials explained by my lecturer. (Student 7)

Extract 2

Yes, I can learn pronunciation from digital tools, yet I only listen and practice to imitate from devices. I sometimes do not know how to use the sentences when speaking with my friends. I think I need more practice to use the sentences in a real-life context. And, lecturer's explanation still plays important roles during the learning process. (Student 8)

Extract 3

It's interesting to learn pronunciation with digital platforms, yet I usually encountered problem with internet connectivity. I'm sometimes get some problems on how to operate the applications or website (Student 10)

4) What opportunities do digital platforms offer to enhance pronunciation instruction in Indonesian university settings, as perceived by the participants?

Based on the data analysis, it was revealed that digital pronunciation devices offer substantial opportunities to enhance pronunciation instruction within Indonesian university settings. University students reported that digital tools provide increased flexibility in instructional delivery, enabling them to incorporate multimodal resources such as audio models, phonetic visualizations, and interactive pronunciation exercises that are difficult to replicate in traditional classrooms.

Extract 1

By using digital devices, I have more opportunities to learn and practice more English pronunciation. I can learn whenever I want. It gives them more learning flexibilities so that I can choose which topic I want to learn first, and which one

I will learn later. (Student 5)

Extract 2

I'm rich with the learning materials. The websites www.manythings.org, www.rong-chang.com, and www.engfluent.com are very beneficial to collect and select authentic learning materials for my students. I'm glad that my lecturer could employ both traditional and modern teaching methods in delivering the materials. (Student 4)

The digital devices were also viewed as facilitating more individualized and data-driven instruction, as automated feedback, progress-tracking features, and adaptive learning systems allow students to monitor their own development and receive targeted support aligned with their specific phonological difficulties.

Students similarly emphasized the benefits of repetitive, self-paced practice afforded by digital applications, noting that these tools reduce anxiety by allowing them to rehearse challenging sounds privately before performing in front of peers and lecturers. They also highlighted the value of access to diverse native-speaker models, which strengthens their exposure to authentic pronunciation patterns beyond the limitations of local classroom environments. Additionally, both lecturers and students recognized that digital platforms promote greater learner autonomy and engagement, particularly through gamified tasks and mobile-based learning that extend pronunciation practice beyond scheduled class hours. Collectively, the analyzed data suggest that digital pronunciation devices hold significant potential to enrich pronunciation pedagogy by expanding access to resources, supporting personalized learning trajectories, and fostering sustained engagement among Indonesian university learners.

DISCUSSION

The results of this study reveal the dynamic interplay between challenges and opportunities in the use of digital tools for pronunciation instruction within Indonesian higher education. The study highlights how digital technologies can enhance learner autonomy and pedagogical effectiveness, while also exposing gaps in digital literacy, institutional support, and infrastructure.

The theme of limited digital literacy among lecturers underscores a persistent barrier to the effective integration of mobile and online tools in pronunciation teaching. While Mobile Assisted Language Learning (MALL) advocates for learner- and teacher-driven use of mobile technologies (Kholid & Reftyawati, 2025; Saran et al., 2009), this study reveals that educators often lack the necessary training and support to fully exploit these tools. This is consistent with prior research suggesting that teacher readiness remains a key determinant in the success of technology-enhanced language instruction (Cochrane & Antonczak, 2013). Without structured professional development, even the most accessible digital tools can remain underutilized or misapplied.

Conversely, the emergence of positive student attitudes and increased learner autonomy aligns well with core principles of MALL. As students independently engage with pronunciation apps, websites, and video materials, they gain control over their

pace, repetition, and exposure to authentic language input. This supports findings of the previous studies which emphasizes that mobile learning environments can facilitate meaningful language practice outside the classroom, especially in contexts where instructional time is limited (Fadillah, 2020; Little, 2020; Putri, 2025). The increased autonomy also fosters greater learner confidence and responsibility as critical factors in pronunciation acquisition which often require sustained and repetitive practice.

However, the technological and institutional barriers reported by participants highlight structural challenges that can hinder the scalability and sustainability of MALL-based practices. Issues such as inadequate digital facilities, high internet costs, and limited institutional investment reflect broader inequalities in access and infrastructure across Indonesian universities. These findings echo the results of previous study arguing that digital inclusion remains a major concern in developing contexts, where mobile learning must contend with socioeconomic disparities and inconsistent institutional support (Fadillah, 2020; Putri, 2025).

Despite these constraints, participants identified significant pedagogical opportunities enabled by digital tools. The use of YouTube videos, mobile apps, pronunciation application, and AI-powered pronunciation tools allowed for more efficient and authentic instruction. Lecturers found these tools particularly useful in modeling accurate pronunciation, providing real-time feedback, and supplementing in-class instruction with multimedia content. This resonates with the existing research by which noted that mobile and multimedia technologies enhance pronunciation instruction by offering immediate, contextualized, and learner-specific input (Godwin-Jones, 2011). In this sense, technology serves not as a replacement for the teacher but as a pedagogical aid that extends instructional reach.

Taken together, these findings suggest that while MALL presents considerable promise for pronunciation instruction in Indonesian higher education, its success hinges on addressing digital literacy gaps, enhancing institutional infrastructure, and supporting both lecturers and students in navigating evolving technologies. Future efforts must focus not only on promoting the adoption of mobile tools but also on creating a supportive ecosystem where technological innovation is matched with pedagogical capacity and institutional commitment.

CONCLUSION

This study has explored the challenges and opportunities of pronunciation instruction in digital contexts within Indonesian higher education, through the lens of the Mobile-Assisted Language Learning (MALL) framework. The findings reveal a complex landscape where technological innovation offers significant pedagogical benefits such as increased learner autonomy, authentic pronunciation models, and enhanced teaching efficiency while simultaneously exposing persistent barriers related to digital literacy, institutional support, and infrastructural limitations.

Despite these challenges, both lecturers and students demonstrated a positive orientation towards integrating mobile and online tools into pronunciation teaching and learning. The study highlights the critical need for targeted professional development to enhance lecturers' digital competencies, alongside greater institutional investment in digital infrastructure and resources. These steps are essential to fully realize the potential of MALL approaches in fostering effective and equitable

pronunciation instruction.

Future research should explore scalable models of digital pronunciation instruction that address socioeconomic and infrastructural disparities, as well as longitudinal studies that examine the impact of sustained technology use on pronunciation outcomes. Ultimately, this study contributes to a growing body of evidence supporting the transformative role of mobile and digital technologies in language education, particularly in developing contexts like Indonesia.

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CONFLICT OF INTERESTS

The researchers declare no conflicts of interest related to the research, authorship, or publication of this article, "Pronunciation Instruction in Digital EFL Programs at Indonesian University: Challenges and Opportunities."

AUTHOR(S) CONTRIBUTION

Sabat. Y.: Conceptualization (lead), methodology (lead), writing–original draft (lead), review (supporting), securing funding. Syakur, A.: Conceptualization (supporting), methodology (supporting), writing–original draft (supporting), review (lead), editing (lead). Musyarofah, L.: Conceptualization (supporting), methodology (supporting), writing–original draft (supporting), review (lead), editing (lead).

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