



Exploring Jordanian university lecturers' TPACK knowledge: Integrating ICT for teaching English pronunciation

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ABSTRACT

This study investigates the technological knowledge (TK) of university lecturers in Jordan concerning the integration of information and communications technology (ICT) tools in teaching English pronunciation. Employing a mixed-methods approach, data were collected through questionnaires and semi-structured interviews to evaluate lecturers' understanding and use of ICT for pronunciation instruction. The findings indicate moderate competence in technology integration, with nearly half of the participants feeling confident in using ICT for pronunciation teaching. However, a significant percentage reported insufficient knowledge, especially in selecting effective tools. Analysis revealed no statistically significant differences in TK based on gender or teaching experience, suggesting these factors do not influence technological competence. Challenges included limited access to specialized pronunciation software and a reliance on basic tools like PowerPoint and interactive whiteboards. Thematic analysis of interview data highlighted obstacles such as a lack of ICT training, unfamiliarity with pronunciation-specific tools, and difficulties in evaluating tool effectiveness. Many lecturers expressed a need for advanced resources and training, while others relied on peer support to address gaps. This study emphasizes the necessity for enhanced resources and targeted training initiatives to improve ICT integration in pronunciation teaching. Future research should explore strategies to strengthen lecturers' TK, particularly regarding ICT's role in higher education contexts.

Keywords: pronunciation teaching, TPACK, TRIPLE E, instructional strategies, student engagement, innovative teaching

INTRODUCTION

Pronunciation teaching and learning practices encompass a diverse array of methods, techniques, and activities that educators employ in the classroom to facilitate pronunciation instruction. These practices not only shape a teacher's educational philosophy but also significantly influence classroom dynamics and instructional methodologies (Baker, 2014; Pennington, 2021). While traditional methods have been demonstrated to be effective in enhancing learners' speaking skills (Darcy, 2018; Derwing & Munro, 2015; Levis, 2018a), recent advancements in technology have introduced new dimensions to pronunciation instruction. Given the increasing significance of intelligibility and comprehensibility in ESL/EFL contexts (Gordon, 2021; Gordon & Darcy, 2016; Levis, 2018a; Trofimovich et al., 2009), the integration of information and communication technology (ICT) has become pivotal in cultivating engaging, efficient, and effective pronunciation learning environments.

ICT provides educators and learners with tools that support both segmental (individual sounds) and suprasegmental (intonation, stress, rhythm) aspects of pronunciation (Calvo Benizes, 2018; Nasim et al., 2022). These technologies facilitate interactive feedback, self-paced learning, and access to native-like pronunciation models, thereby addressing many traditional challenges associated with pronunciation instruction. Digital platforms, software, and applications offer auditory and visual aids, enabling learners to focus on critical pronunciation elements and monitor their progress effectively (Kennedy & Trofimovich, 2010).

Despite these advantages, the application of ICT in pronunciation teaching remains underexplored, particularly within higher education settings, where lecturers' technological knowledge (TK) is crucial for its effective integration. Pronunciation instruction often receives minimal attention compared to other language skills, suffering from what has been termed the "Cinderella syndrome" (Levis, 2018b), a metaphor highlighting the limited focus it receives within language curricula (Celce-Murcia et al., 1996; Seyedabadi et al., 2015). Research indicates that this neglect may stem from teachers' uncertainty regarding effective

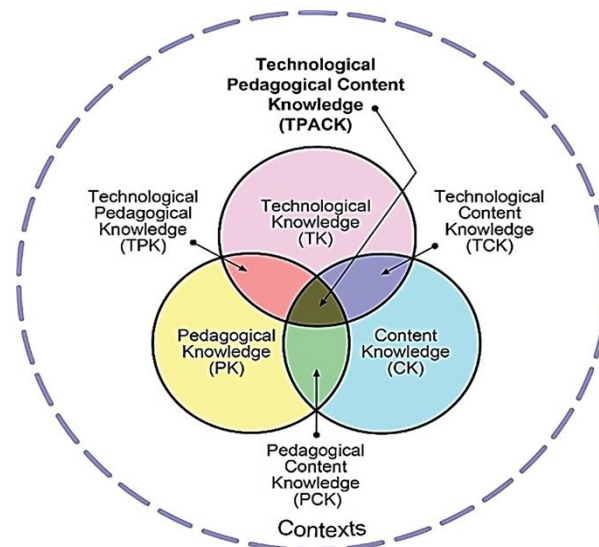


Figure 1. Technology pedagogical content knowledge framework (<http://tpack.org>)

pronunciation teaching methodologies and a lack of confidence in their ability to leverage new technologies for pronunciation instruction (Darcy, 2018; Macdonald, 2002).

A persistent challenge lies in the absence of systematic approaches for integrating ICT into pronunciation teaching. Although many educators acknowledge the potential of technology to facilitate pronunciation learning, they often encounter obstacles such as inadequate access to ICT resources, limited training opportunities, and uncertainties regarding the effective implementation of these tools (Baker, 2011; Darcy et al., 2012). Prior studies suggest that, without adequate guidance and hands-on experience, educators may revert to traditional, lecture-based methods instead of utilizing the interactive capabilities of technology (Foote et al., 2011; Wahid & Sulong, 2013).

Existing research on pronunciation instruction has heavily relied on educators' self-reported data collected through questionnaires and interviews, providing insights into their perceived competence and beliefs (Buss, 2015; Yagiz, 2018). However, this methodology often overlooks how these beliefs translate into actual classroom practices. While classroom observation could provide a more comprehensive view of how ICT is employed in authentic teaching contexts, this study focused exclusively on data gathered through questionnaires and semi-structured interviews, examining educators' self-reported perceptions of their TK and their utilization of ICT in pronunciation instruction. The lack of classroom observation may limit research findings to teacher-reported data, which frequently fails to capture the subtleties of real-time instructional practices (Alghazo, 2016).

In this study, questionnaires and semi-structured interviews were employed to obtain insights into educators' self-reported use of ICT and their perceived competence in integrating it into pronunciation teaching. While classroom observation could enhance future research, practical limitations such as time constraints and accessibility to classrooms influenced the scope of this investigation. The focus remains on the perceptions and experiences articulated by educators through the questionnaires and interviews, offering a rich source of data regarding their TK and instructional practices.

By examining the TK of university lecturers in Jordan and their application of ICT in pronunciation teaching, this study aims to address the gap in understanding how ICT contributes to pronunciation instruction. It explores not only the perceived competence of educators but also the challenges and experiences they face in utilizing ICT to support pronunciation learning. The findings offer valuable insights for enhancing training programs and fostering improved ICT integration in ESL/EFL pronunciation pedagogy.

Despite the challenges and limited use of ICT in pronunciation teaching, the integration of technology presents significant potential for enhancing intelligibility, comprehensibility, and overall language accuracy within the classroom. However, further research that incorporates classroom observation is necessary to fully comprehend how these technologies are implemented and their impact on student outcomes. While this study relies solely on data gathered through questionnaires and semi-structured interviews, future research could benefit from combining these methods with direct classroom observation. This approach would enable a more comprehensive exploration of both educators' perceptions and their actual classroom practices, facilitating a clearer understanding of the real-world application and impact of ICT on pronunciation instruction. By focusing on both educator perceptions and classroom practices, this study will contribute to the development of more effective ICT training and support for university lecturers, ultimately enhancing the quality of pronunciation instruction in Jordanian higher education and beyond.

Theoretical Framework

To achieve effective learning goals, university teachers must have a good understanding of how ICT can be blended with subject content knowledge and their teaching strategies. Thus, finding a suitable framework that can explain university lecturers' skills and knowledge regarding ICT integration was a critical point in this research study. According to Mishra and Koehler (2006), the TPACK framework identifies the types of knowledge that teachers need to integrate ICT effectively into their teaching practices. As the first to propose this framework, Mishra and Koehler (2006) classified TPACK into three bodies of knowledge. These are pedagogical knowledge (PK), subject content knowledge, and TK (see **Figure 1**).

Groth et al. (2009) stated that for effective integration of ICT into teaching, university teachers must understand how pedagogy, content, and technology can cooperate to construct efficient discipline-based teaching with ICT. Thus, there is a need to further examine university lecturers' knowledge regarding the TPACK framework to understand how it can guide them in successfully incorporating ICT into their actual teaching classrooms. Accordingly, the TPACK framework provides a way of thinking about how ICT can be successfully implemented, particularly the knowledge required to integrate ICT into the classroom. The framework has been extensively studied by many researchers to investigate teachers' knowledge and skills associated with ICT integration (e.g., Abbitt, 2011; Gökçe et al., 2014; Mishra & Koehler, 2006; Tai, 2013).

Mishra and Koehler (2006) asserted that the availability of technology in classes does not guarantee that teachers can efficiently integrate ICT into their teaching practices. Thus, this signifies the significance of the TPACK framework as a guide for teachers to understand how to integrate technology into their classrooms (Doering et al., 2014; Karaca, 2015; Kimmons, 2015; Stover & Veres, 2013). According to Abbitt (2011), the TPACK framework has a viable model for the knowledge base that supports technology integration into the classroom environment.

LITERATURE REVIEW

The Necessity for CALL and CAPT in Pronunciation Teaching and Learning

As mentioned previously, some teachers teach English pronunciation through printed materials using the phonetic alphabet and activities such as minimal pair drills and listening to a cassette since they provide teachers with samples of native-speaker language to use in their classes (Celce-Murcia et al., 2010). Nevertheless, the past decade has witnessed an explosion in the massive development of computer-assisted language learning (CALL) and interest specifically in computer-assisted pronunciation tools (CAPT) with a recent proliferation of web-based and mobile apps and resources which have proven to be effective in teaching and learning English pronunciation by offering access to a variety of fluent models (e.g., received pronunciation or general American) and granting teachers the opportunity to use many exercises for practice, creating a non-threatening environment to imitate and providing more visual, implicit and realistic feedback such as automatic speech recognition (Celce-Murcia et al., 2010; Gordon, 2021; Rogerson-Revell, 2021; Sadeghi, 2013; Walker, 2005). In his study, Walker (2005) used student-produced recordings to promote pronunciation accuracy, and the results found that students' recordings improved their pronunciation. The recordings increased their motivation and autonomy and permitted them to evaluate themselves. These recordings were analysed by speech analysis software, which improved their pronunciation.

Sadeghi (2013) carried out a study using CALL. The findings of his study revealed that Japanese EFL learners improved their perception and production of English consonants by using CALL. The researcher used audio and audio-visual media for perceptual training of English consonants, and it was demonstrated that the audio-visual presentation is better than the audio one and that the improvement of pronunciation depends on the perceptual training. Other studies found that the integration of technologies has proven its effectiveness in enhancing students' achievement scores and their attitudes and motivation towards learning (see Hsu & Chen, 2019; Kerouad & Fagroud, 2015; Wekerle et al., 2020). For instance, when Wekerle et al. (2020) examined ICT incorporation in the context of Norwegian higher education, the results found that students felt engaged and that it positively impacted their learning outcomes since they used it in active, constructive, and interactive activities.

Ghanizadeh et al. (2015), for example, found that the integration of technology in almost all areas of language education was useful in improving the quality of input, making communication authentic, and providing timely and relevant feedback. Thus, the findings from the preceding empirical studies indicated that one of the main benefits of incorporating digital technology is its ability to improve both learning and teaching English pronunciation while also providing enjoyable and interesting activities for both learners and teachers. As a result, teachers can modify their pronunciation instruction by using a computer, which is one of the useful methods for improving pronunciation instruction. At the same time, tools and resources must be technically intuitive and robust so as not to exclude less experienced users.

Equally, the novelty value of the 'wow' factor can soon wear off if not supported by solid pedagogic foundations. Teachers need to consider the affordances of CALL/CAPT resources when evaluating their usefulness and implementing them in teaching to understand what elements of technology can add value or enhance pronunciation in teaching, learning, or assessment. Consequently, language teachers need more training and practice in or near actual teaching contexts (White et al., 2014), 34 contextualized activities that mimic specific teaching challenges (Kessler & Plakans, 2008), more support for situated training and institutional support (Hanson-Smith, 2006), and more collaborative and reflective hands-on practices (Farr & Riordan, 2012).

Even though there is agreement on the need for more training in technology integration in the preparation of language teachers, there is little agreement on the established consensus on methods and content of technology training in language teacher education contexts in terms of quality control to evaluate how rigorous or effective they are in terms of pronunciation teaching and learning.

According to Reinders (2009), the lack of agreement is attributable to whether and how to incorporate technology into teacher education since technology education encompasses a broad range of elements, covering both pedagogical and technological aspects. As Rogerson-Revell (2021) asserted, "technological novelty tends to take center stage and may temporarily disguise a lack of pedagogic rigor but is unlikely to maintain motivation in the long term" (p. 191). Thus, many teachers have difficulty finding the most effective tools to incorporate ICT into pronunciation teaching due to "the sheer numbers and variety of the available technologies, which may seem daunting to teachers who are simply looking for effective tools to use in their classrooms" (Yoshida, 2018, p. 196).

Kaiser (2018) found that many mobile apps have been developed with more attention paid to appearance and flash than to pedagogical principles. Thus, “many teachers feel unsure about how to teach pronunciation at all, and the idea of using computers, mobile devices, or other technology may make pronunciation teaching seem doubly intimidating” (Yoshida, 2018, p. 195). Accordingly, it is a step in the right direction for CALL and CAPT to play a significant role in language teacher education when CALL/CAPT contributes to 35 students’ learning of English language since many EFL/ESL teachers have received limited professional training programs in phonetics or pronunciation pedagogy (e.g., Breitzkreutz et al., 2001; Derwing, 2010; Saito & van Poeteren, 2012).

Park and Son (2009) reported that the success of integrating technology largely depends on the teachers’ positive teaching and learning experiences in using and applying CALL/CAPT meaningfully, especially in the classroom. Thus, to suggest an evidence-based model to inform teacher education, the effective strategies to be used in language teacher education for technology integration need to be specified. To this end, the researcher will adopt Kolb’s (2017) TRIPLE E framework, which stands for engagement, enhancement, and extension, to train university teachers to effectively enhance their TPACK competencies and teaching practices in teaching English pronunciation.

Therefore, teachers are in urgent need of understanding how the integration of technology works in a way that supports English language learners through related courses, workshops, and seminars (Hubbard & Levy, 2006). Teachers’ professional development should not solely learn novel tools and skills, more significantly, it should fulfil the actual classroom needs to achieve considerable benefits (Guichon & Hauck, 2011; Hubbard, 2013; Hubbard & Levy, 2006; Thang & Gobel, 2012; Wang & Reeves, 2003). In light of this, Kolb (2020) stated that the integration of technology requires the right amount of knowledge of both technology and its pedagogical strategies. To put it simply, the integration of technology merely for technology’s sake has no benefits unless it is efficiently directed by pedagogical perspectives.

METHODOLOGY

This study aims to address the following question: What TK do Jordanian university lecturers have regarding ICT use in teaching English pronunciation at the university level? To respond to this research question, two main aspects were investigated:

- (1) lecturers’ knowledge of ICT and
- (2) lecturers’ use and access to ICT tools specifically for pronunciation teaching.

Data Collection

The data for this research study were collected through a combination of questionnaire surveys and semi-structured interviews. This dual-method approach aimed to comprehensively understand lecturers’ perceptions of the ICT tools used for teaching pronunciation and to investigate their TK in this specific context.

Questionnaire

A questionnaire was designed to gather quantitative data regarding lecturers’ perceptions of technological tools utilized in pronunciation teaching. The questionnaire was distributed among a targeted sample of lecturers (N = 81).

Semi-structured interviews

Semi-structured interviews were conducted to delve deeper into the perceptions of lecturers and to explore their TK in the context of pronunciation teaching (N = 12). The interviews were tailored to focus on specific aspects related to the use of ICT tools for pronunciation instruction. This method allowed for a more nuanced understanding of lecturers’ experiences and expertise in utilizing technology for pedagogical purposes.

Data Analysis

Quantitative analyses were performed using SPSS and Excel spreadsheets. The data obtained from the questionnaire responses were subjected to various statistical analyses to identify patterns, trends, and correlations. This quantitative analysis provided statistical evidence to support the findings derived from the questionnaire.

Qualitative data obtained from the semi-structured interviews were analyzed using thematic analysis. This approach involved identifying recurring themes, patterns, and categories within the interview transcripts. Through a systematic coding process, themes related to lecturers’ perceptions of technological tools and their TK in pronunciation teaching were extracted.

RESULTS

Questionnaire Results

Descriptive analysis of lecturers’ technological knowledge and pedagogical knowledge (sub-scales)

The analysis of the questionnaire responses provides insights into university lecturers’ technological and pedagogical knowledge (TK/PK) regarding English pronunciation teaching. Nearly half of the respondents expressed confidence in integrating technology into pronunciation teaching across various sub-factors, while approximately 10% lacked confidence in all areas. Regarding TK, a majority of respondents reported competence in technical skills, yet a notable percentage acknowledged

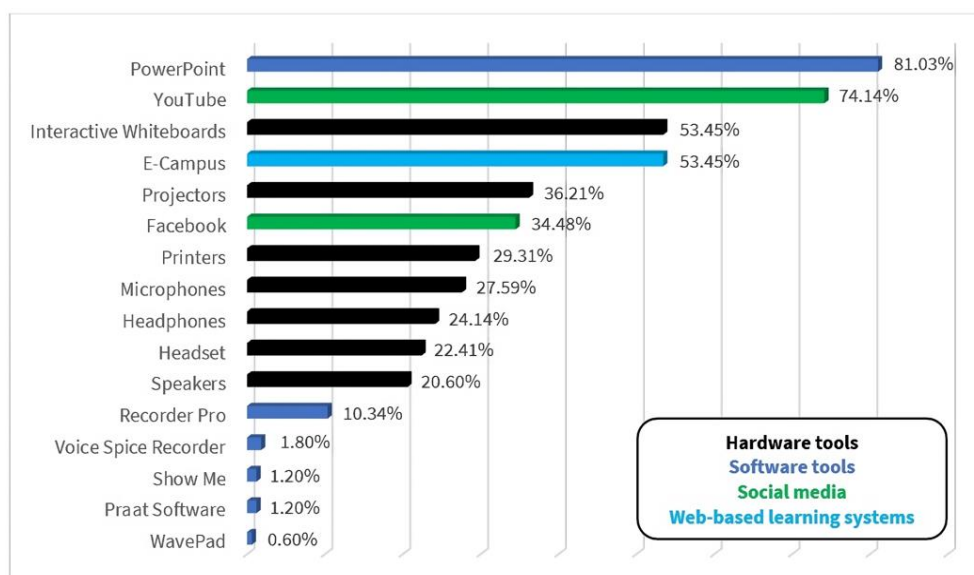


Figure 2. Participants' access to ICT tools and applications in pronunciation teaching in the language and computer lab (Source: Authors' own elaboration)

insufficient ICT knowledge. Similarly, while many felt competent in selecting appropriate tools for teaching pronunciation and facilitating communicative approaches, a significant proportion expressed uncertainty in this aspect. PK analysis revealed a moderate level of familiarity among lecturers with diverse teaching strategies, albeit with a considerable percentage expressing uncertainty or low competence, particularly in selecting effective teaching strategies. The analysis of gender and teaching experience revealed no statistically significant differences in TK or PK levels among university lecturers, indicating that these competencies remain unaffected by these factors.

Participants' access to tools and applications

The findings indicated varied access to hardware tools and software applications across classrooms, language labs, and computer labs. While interactive whiteboards, desktops/laptops, and PowerPoint were commonly accessible, tools such as VoiceTube and Praat software were less available. Notably, access to learning and pronunciation tools was limited across all environments, highlighting potential gaps in resource availability (Figure 2).

The frequency of use of ICT in pronunciation teaching

Frequency of ICT tool usage varied across environments, with interactive whiteboards and desktops/laptops frequently used in classrooms. In contrast, auditory tools like headsets and speakers were more commonly utilized in language and computer labs. While software tools like PowerPoint and YouTube were frequently employed inside classrooms, their usage decreased in lab settings. Notably, the usage of learning apps and pronunciation tools remained low across all environments.

Statistical analysis revealed significant differences in the frequency of hardware tool usage based on gender and age, with older lecturers showing higher usage rates. However, teaching experience did not significantly affect software tool usage frequency (Figure 3).

Functional activities of ICT tools

In teaching segmental and suprasegmental features, hardware tools like interactive whiteboards and desktops/laptops were consistently utilized across environments. However, access to learning apps and specific pronunciation tools remained limited. Similarly, for guiding homework and assessment, hardware tools were frequently used, but software tools and pronunciation tools were underutilized such as Learning Games, Praat software, Kahoot, Google Classroom, Google Voice Search, and Quizlet.

The results highlight the varying levels of technological and pedagogical competence among university lecturers, with implications for English pronunciation teaching practices. Limited access to and usage of learning and pronunciation tools indicate potential areas for improvement in resource provision and training initiatives. Further research could explore strategies to enhance lecturers' technological and pedagogical competencies to optimize pronunciation teaching outcomes.

Semi-Structured Interviews Results

In this qualitative section, thematic analysis was employed to scrutinize the perceptions of university lecturers regarding their use of and access to technological tools. Additionally, their insights regarding the evaluation and selection of appropriate technological tools for teaching pronunciation were examined. It is noteworthy to acknowledge that during the interviews, there was a variation in the language used by the participants. Some interviewees spoke exclusively in English, while others engaged in discussions predominantly in Arabic, occasionally interspersing their discourse with English. The results of the interviews generated three subthemes:

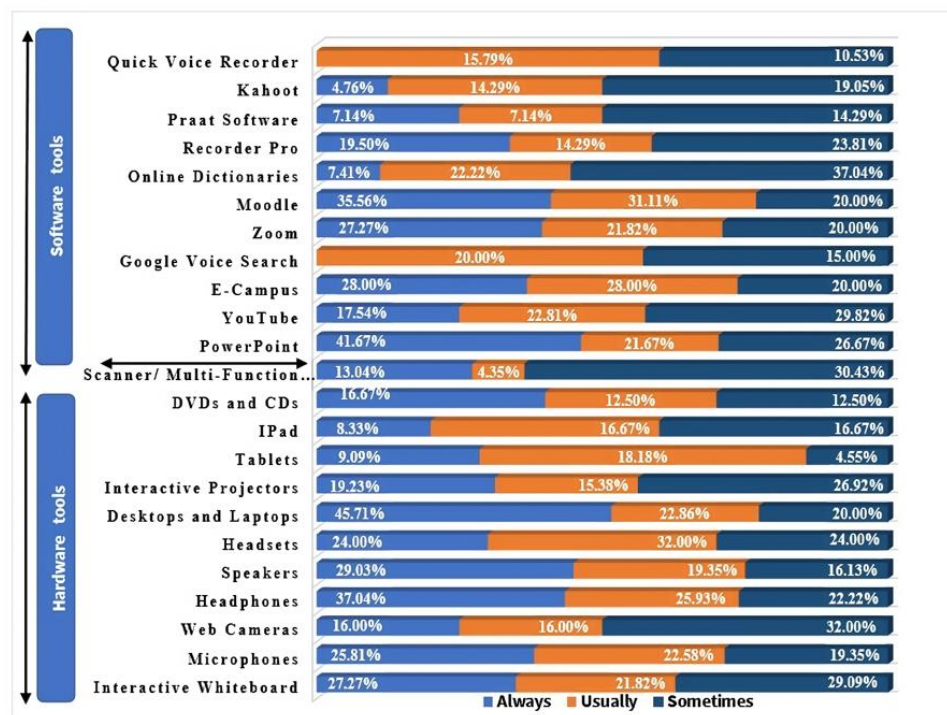


Figure 3. The frequency use of ICT tools in pronunciation teaching in the language lab, computer lab, and classroom (Source: Authors' own elaboration)

Lack of ICT training

The first subtheme that emerged from the thematic analysis was the lack of ICT training. This subtheme was reported as a challenge by some respondents. UL2 highlighted this issue as a significant problem faced by university lecturers:

“A very important point is that we are all not well trained on how to use technology” (UL2).

Some interviewees mentioned that when they need to integrate ICT, they seek help from colleagues. For example, UL1, UL6, and UL9 explained that due to their lack of ICT training, they rely on assistance from colleagues within their respective departments.

“The selection of a particular technology to teach English pronunciation depends on the common knowledge and experience of my colleagues; they tell me about an example of technology” (UL9).

“I try to get feedback about it from my colleagues” (UL6).

In summary, the responses above indicate that some university lecturers lack sufficient training in ICT. The results also suggest that some of them have insufficient sources from which to obtain information and knowledge about the use of ICT in pronunciation teaching.

Unfamiliarity with effective tools

This subtheme suggests that their lack of familiarity with effective technological tools necessitates ICT training. Most respondents perceived themselves as familiar with only certain presentation-oriented tools for teaching English pronunciation. For example, UL2, UL3, UL4, UL5, and UL6 expressed that they were not competent and not confident in identifying new technological tools for teaching English pronunciation. UL12 mentioned that there was nothing else to compare to since they used only blackboards and PowerPoint. He highlighted that this constituted the entirety of the technology they employed in teaching English pronunciation:

“We do not use other things to compare, as we start with the blackboard and move to the PowerPoint. You might have something better in mind than this [...] I do not know” (UL12).

Similarly, UL6 talked about how she used only PowerPoint and Microsoft Word. Additionally, UL4 spoke about the use of Zoom and said:

“We have no other choice but to use Zoom meetings and the chat board provided by Zoom meetings” (UL4).

What can be gleaned from the responses above is that there was limited use of specific ICT tools in pronunciation teaching, and they believed this limited their ability to effectively teach pronunciation. However, these lecturers were able to use other

applications to remediate this apparent issue. For example, UL11 argued that the only tool she was comfortable using was Google Translate to find the correct pronunciation. UL3 noted that she used only Wikipedia, YouTube, Google Drive, and e-learning for pronunciation. However, UL9 indicated that the only technology he used was PowerPoint slides, commenting that:

“I use only PowerPoint slides. I give them [the students] printed notes and have them write down important points [...] for me, I do not use any other educational tools” (UL9).

In summary, the responses above reveal that university lecturers primarily used basic software, such as PowerPoint, Microsoft Word, Zoom, and traditional blackboards, to support the learning process. However, they perceived themselves as unfamiliar with specialized pronunciation apps and learning tools designed for teaching and learning English pronunciation.

Inability to evaluate effective technological tools

When the participants were asked about their ability to determine and evaluate effective technological tools for teaching pronunciation, the majority commented that they had insufficient knowledge of whether the tools were effective. For example, when asked, “Are you able to determine the educational qualities of a technological device or tool?”, UL2 said that it would be difficult for her to do this because she is not an IT expert who can evaluate and make good use of software tools for teaching and learning English pronunciation in the medical field.

UL4 and UL5 discussed their evaluation of tools, which was based mainly on their listening to videos for one or two minutes and then deciding without using any rubrics. Regarding this issue, UL6 stated that it is difficult to determine the quality of educational tools:

“It is supposed to be by specialists, but I still cannot determine the quality of these tools” (UL6).

Surprisingly, a common view amongst interviewees was that they lacked specific rubrics to evaluate the efficiency of the tools. For example, UL7 said:

“But to know about specific rubrics for the evaluation of tools, [...] honestly speaking, no” (UL7).

Another interviewee, when asked about the same issue, said:

“I have no way of knowing whether this tool is professional or not” (UL 10).

DISCUSSION

This study investigates the TK of in-service university lecturers when integrating ICT into teaching English pronunciation in higher education in Jordan. It also explores the frequency of ICT use and functional activities in pronunciation instruction, assessing the relationships between TK, the frequency of hardware and software tool usage, and factors such as gender, age, and teaching experience.

The results reveal that many participants lacked confidence in their TK, supported by interviews with university lecturers. This suggests that Jordanian university lecturers generally lack essential TK for teaching English pronunciation with ICT, consistent with findings from previous researchers like Alharbi (2014), Archambault and Crippen (2009), Kazoka and William (2016), Mailizar and Fan (2020), and Yoshida (2018). For instance, Alharbi (2014) reported that Saudi high school teachers had low to moderate levels of TK. Similarly, Archambault and Crippen (2009) found that EFL school teachers demonstrated limited TK, dissociated from content and pedagogical knowledge, and recommended TK-focused training workshops to enhance ICT integration. Additionally, Kazoka and William (2016) and Mailizar and Fan (2020) highlighted similar gaps in TK among educators.

This study distinguishes itself by focusing on university lecturers' use of ICT tools in pronunciation teaching, specifically in the context of private and state Jordanian universities. Although previous studies on the integration of ICT into language teaching exist, most do not specifically address its use in pronunciation instruction, making this research a significant contribution to the field.

Initially, gender and teaching experience were considered factors influencing university lecturers' TK. However, after thorough analysis, it was determined that there was no statistically significant difference in TK based on these factors. This finding aligns with the work of Adulyasas (2017), Alghamdi (2017), and Alnajjar and Al-Jamal (2019) but contrasts with studies that found gender-based differences, such as Alahmari (2013) and Cheng (2017). Cheng (2017), for example, observed that Taiwanese male teachers had more confidence in their TK than their female counterparts. Given the inconclusive nature of the literature on gender differences in TK, further research focusing on this variable is recommended.

In summary, the results suggest that Jordanian university lecturers need to improve their TK, regardless of gender and teaching experience, to effectively integrate ICT in teaching pronunciation. Lecturers should explore new strategies for teaching pronunciation that address students' challenges, particularly in professional fields like medicine.

The study found that university lecturers had access to various presentation-oriented tools, such as PowerPoint, projectors, interactive whiteboards, laptops, and desktops, commonly used in classrooms, language labs, and computer labs. These tools are essential for creating visual content, and their widespread use is consistent with Meo's (2013) findings on the increasing use of

PowerPoint presentations among EFL teachers. However, while lecturers had access to communication tools (e.g., WhatsApp, Facebook) and management tools (e.g., Moodle, E-Campus), their access to specific pronunciation software was limited.

Despite the potential of computer technologies to enhance pronunciation teaching, the study reveals that university lecturers lacked access to learning apps and pronunciation-specific tools like Praat and YouGlish. This finding aligns with Pirasteh's (2014) study, which reported that even when effective pronunciation tools were available, Iranian teachers did not integrate them into their teaching. Similarly, Alshare et al. (2003) found that Jordanian university instructors had minimal access to specialized software, reinforcing the notion that ICT integration in Jordanian higher education remains limited.

Regarding the influence of teaching experience on the frequency of hardware tool use, the findings indicate that more experienced lecturers were more frequent users of hardware tools. This result is consistent with studies by Egbert et al. (2002) and Giordano (2007), which found that teachers with more experience in using CALL activities integrated ICT more effectively into their teaching practices.

The study also found a statistically significant difference between the frequency of hardware tool usage and gender, with male lecturers using these tools more frequently than female lecturers. However, no significant difference was found in the frequency of software tool usage based on gender. Additionally, lecturers aged 40 and older were more frequent users of hardware tools, which is consistent with findings by Yaghi (2001) and Henry (2008). This suggests that older lecturers, being more comfortable with their subject matter, may have more time to design learning experiences incorporating ICT.

This study explored the functional use of ICT in teaching pronunciation, including its use in teaching segmental and suprasegmental features, guiding students with homework, and assessing pronunciation performance. The results showed that university lecturers primarily used presentation-oriented tools (e.g., PowerPoint, smartboards, projectors) for teaching pronunciation. However, only a small number used specialized pronunciation tools such as Praat, ShowMe, or WavePad.

These findings highlight the limited use of effective pronunciation tools in Jordanian universities. Although CAPT like Praat and YouGlish have been shown to enhance pronunciation learning (Levis, 2007), university lecturers in this study were largely unfamiliar with such tools. This suggests a gap between available technology and its actual integration into pronunciation teaching.

It is important to acknowledge the limitations of this study's data collection methods. The data relied on questionnaires and interviews, capturing lecturers' self-reported perceptions of their competence in using ICT. Without classroom observations, it is difficult to assess the actual integration of ICT into teaching practices. As noted in the feedback, relying solely on perceived competence may not provide a complete picture of how effectively ICT is being used in practice.

In conclusion, this study underscores the need for Jordanian university lecturers to improve their TK to effectively integrate ICT into pronunciation teaching. Despite access to basic ICT tools, their use of specialized pronunciation tools remains limited, reflecting a broader issue of underutilization of available technology in higher education. Future studies should incorporate classroom observations to provide a more comprehensive assessment of ICT integration and focus on practical training for lecturers in using effective technological tools for pronunciation instruction.

IMPLICATIONS AND CONCLUSIONS

In conclusion, this study provides valuable insights into the TK of university lecturers when teaching English pronunciation in Jordanian higher education institutions. The findings highlight the current state of lecturers' TK, access to ICT tools, frequency of ICT use, and practical application in pronunciation teaching. Firstly, the study revealed that many participants lacked confidence in their TK related to ICT use in pronunciation teaching, indicating a need for further training and support in this area. This aligns with previous research, which emphasizes the importance of improving teachers' competence in integrating technology into their pedagogy to enhance the effectiveness of pronunciation instruction. Secondly, the study found no statistically significant differences in TK based on gender or teaching experience, suggesting that these demographic factors do not play a significant role in determining lecturers' technological competence. However, further research could explore potential nuances related to gender and TK.

Thirdly, the study identified disparities in access to ICT tools, with lecturers having better access to general presentation-oriented tools (e.g., PowerPoint) but limited access to specialized pronunciation applications. This suggests a need for universities to broaden their technological offerings and provide access to tools specifically designed for pronunciation instruction. Moreover, while more experienced lecturers tended to use hardware tools more frequently, the lack of specific pronunciation tools points to an underutilization of technology that could greatly enhance teaching effectiveness. This underscores the need for ongoing professional development and training, not only in the use of existing tools but also in adopting more advanced, specialized applications that can address pronunciation challenges effectively. Finally, the limited use of specific pronunciation tools suggests that while technology is available, there is a gap in its effective utilization in the classroom. This highlights the need for more targeted support to help lecturers familiarize themselves with, and implement, innovative ICT tools designed for pronunciation teaching.

Overall, this study contributes to the literature by providing empirical evidence on the TK of university lecturers, their access to ICT tools, and their frequency of ICT use in pronunciation teaching. These findings have implications for curriculum development, teacher training programs, and institutional policies. By addressing the identified gaps and fostering a supportive environment for technology-enhanced pronunciation instruction, universities can better equip lecturers to improve students' pronunciation skills and, in turn, their overall communication competence.

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Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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