Exploring Teachers' View on Technology and a Sustainable Adoption Framework in Language Teaching and Learning: A Systematic Review

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Abstract

This systematic review investigates teachers' viewpoints on technology integration in language teaching and learning, focusing on developing a sustainable adoption framework. Using the PRISMA framework, 225 peer-reviewed articles were initially selected, and 35 articles were finally included as they specifically addressed teachers' attitudes towards technology. Noteworthy findings reveal that 90% of these articles reflect positive perceptions among teachers, indicating a belief in technology's potential to enhance learning and teaching. However, despite this optimism, approximately 90% of those with positive views encounter challenges in effectively integrating technology into their teaching practices. The identified challenges underscore the need for a sustainable framework to promote technology integration into language teaching and learning. The findings contribute to the discourse on technology integration in language education, offering practical implications for educators, institutions, and policymakers. The proposed sustainable framework guides overcoming challenges and ensuring holistic and sustained technology integration in language teaching and learning.

Keywords: teacher, technology, sustainable, adoption framework, language, literature review

1. Introduction

Many initiatives are being undertaken in an ever-more digitalized society to empower educators with additional resources to enhance their work in the classroom and assist students in becoming digitally literate citizens (Fraillon et al., 2014). We have seen a range of tools enter classrooms in recent years, from general resources like computers to more specialized ones like specialized apps. But the effectiveness of the tools depends on the teachers' willingness to use them and, more significantly, whether they believe they meet their needs (Bunting et al., 2021). The emergence of technological tools in language learning and teaching is a direct outcome of the widespread access to a diverse array of resources facilitated by the Internet and computers. Educators have been under increasing pressure in recent years to revamp educational approaches by incorporating technology into schools (Keengwe & Onchwari, 2009). Furthermore, Ahmadi (2017) emphasized the significance of the instructional methods employed by educators in their classrooms as a crucial factor in fostering the language learning process.

According to Rich (2014), we can improve our practice and knowledge of teaching language to young learners by using the flow of ideas and information made possible by technological advancements. Moreover, it is imperative to support language teachers in the twenty-first century in becoming more reflective in their work (Sowa, 2014). Students' Academic accomplishment is concurrently developed, and student performance improves due to teachers' professional and personal growth (Carey, 2004). However, Warschauer (2000) emphasized that the main obstacles to incorporating technology into language curricula are misconceptions and fear. For example, there is a prevailing belief among administrators and teachers that using computers is detrimental and lacks utility (Thelmadatter, 2007). Examining the viewpoints of educators who play a pivotal role as intermediaries in this educational transformation is vital to understanding the effects of this technology revolution.

The amount, reliability, and range of technologies incorporated into language learning are noteworthy. Technologies have been widely used to teach and learn various subjects, including language education (Chen et al., 2020; Slavuj et al., 2017). According to Lewis (2004), various technology resources can be used in language learning environments, including podcasts, weblogs, e-cards, e-groups, e-mail, downloaded materials, and many more. Lewis (2004) further

claims that educational websites with humorous themes and subjects help liven up conventional instruction. Teachers can also access a vast array of computer and mobile applications, and learning management systems are only another example of technology aids (Sulaimani et al., 2017).

Additionally, in many developed nations, well-known devices for language learning—like personal computers and internet access—have become almost universal. Additionally, the availability of relatively new technology is growing, such as smartphones and other mobile internet-accessible gadgets. Some emerging technologies exist, such as natural language processing (NLP) (Golonka et al., 2014). When technology advances, becomes more accessible, and is tailored for language education, educators may need to modify their pedagogical approaches or lesson plans to best use the resources at hand.

The educational landscape has long been shaped by the influence of technology, serving as a crucial element within the teaching profession. Teachers utilize technology as a fundamental tool to enhance their students' learning journey. The term 'integration' comes into play when discussing the incorporation of technology in education. In today's tech-centric world, it is imperative to reconsider the traditional notion of integrating technology into the curriculum and instead focus on seamlessly embedding technology into teaching practices. This shift signifies the transformation of technology from a mere addition to the curriculum to an indispensable component woven into every stage of the learning experience. Thus, technology is an integral aspect of the educational process, impacting teachers from the initial stages of lesson preparation to the actual teaching and learning phases (Eady & Lockyer, 2013). Bull & Ma (2010) claim that language learners can access infinite resources thanks to technology. İlter (2015) highlighted that for students to succeed in language acquisition, teachers should encourage them to use computers to discover appropriate exercises.

Furthermore, Larsen-Freeman & Anderson (2011) endorsed the idea that technology offers instructional materials and expands the realm of learning for students. With technology, students might be motivated to study languages by having access to a wealth of real materials. Technology greatly impacts teachers' teaching strategies and plays a big part in encouraging student actions. Teachers can never keep up with modern technologies if they do not include them in their lessons. Therefore, when teaching language skills, teachers must be fully conversant with this technology (Gilakjani, 2017; Shyamlee & Phil, 2012). Comprehending educators' perspectives is crucial in formulating tactics to maximize the utilization of technology to promote language learning and mastery.

The importance of integrating technology into language learning and teaching has grown in recent years. However, the viewpoint of parents and instructors should be more considered when it comes to the use of digital technologies to personalize learning, as technology companies aim to sell their solutions, and administrators try to increase educational efficiency and performance (Bulger, 2016). It is troublesome since one of the clear issues raised by these developments is how the job of the human teacher has changed (Selwyn, 2019). Therefore, its adoption must be sustainable to guarantee technology's long-term effects on education. This systematic review aims to investigate how instructors perceive technology and develop a framework for its sustainable use in language instruction. Instructors are frequently urged to incorporate technology into their lessons, but they might not receive training on how to do so (Cirocki & Farrell, 2019). Many nations have incorporated technology into their education policies, recommending teachers across various subjects to embrace its utilization. For instance, in the United States, the National Council of Teachers of Mathematics (NCTM, 2015) encourages technology integration in teaching. It defines "effective teachers" as those who maximize the advantages of technological tools. However, a study by McCulloch et al. (2018) found that teachers' incorporation of technology lagged significantly behind the expectations set by NCTM. Similarly, Li (2014) noted that the use of technology among secondary school teachers in China was predominantly confined to employing PowerPoint as a presentation tool.

This review will explore the integration of technology into language education by examining pertinent literature. It aims to understand how language educators incorporate technology into their teaching and learning practices while also identifying the factors influencing teachers' acceptance and utilization of technology in the classroom. The review will also examine how technology might support sustainable language learning and teaching progress. The results of this review will clarify the existing situation regarding the use of technology in language education. They will guide the creation of frameworks for sustainable adoption, which will facilitate the successful incorporation of technology into language instruction. By providing insightful information to educators, academics, and policymakers alike, this systematic review hopes to make a substantial contribution to the current conversation.

2. Methodology

2.1 Search Strategy and Selection Criteria

This review adhered to the PRISMA framework in examining existing literature (Bamiro et al., 2023; Keathley-Herring et al., 2016). Following the guidelines outlined in PRISMA, the scoping procedure was employed to identify the most pertinent articles related to technology in language teaching and learning. This approach streamlined identifying essential aspects of critical lessons and categorized potential search keywords (Shu et al., 2019).

Multiple search combinations of keywords were executed to retrieve pertinent publications from reputable research databases such as Scopus and Google Scholar. We utilized a set of pertinent keywords related to the integration of technology into language teaching and learning to identify relevant literature. Initially, we employed keywords such as "Technology and language education", "Technology and language teaching and learning", "Technology and language teaching", and "Technology and language learning." To ensure specificity in addressing our research questions, we further refined the search query, incorporating keywords like "Technology and language education and teachers' perception", "Technology and language education and teachers' belief", and "Technology and language education and teachers' views". The data search underwent refinement based on predefined inclusion and exclusion criteria and adherence to quality standards.

The literature search spanned from 2010-2023. Initially, 225 documents were identified, encompassing various types such as research articles, reviews, editorials, book chapters, and others. Duplicate articles were excluded, resulting in 214 articles. The focus was then narrowed down to research articles and review papers, resulting in the final selection of 35 articles. Figure 1 visually represents the PRISMA framework's implementation in this review.

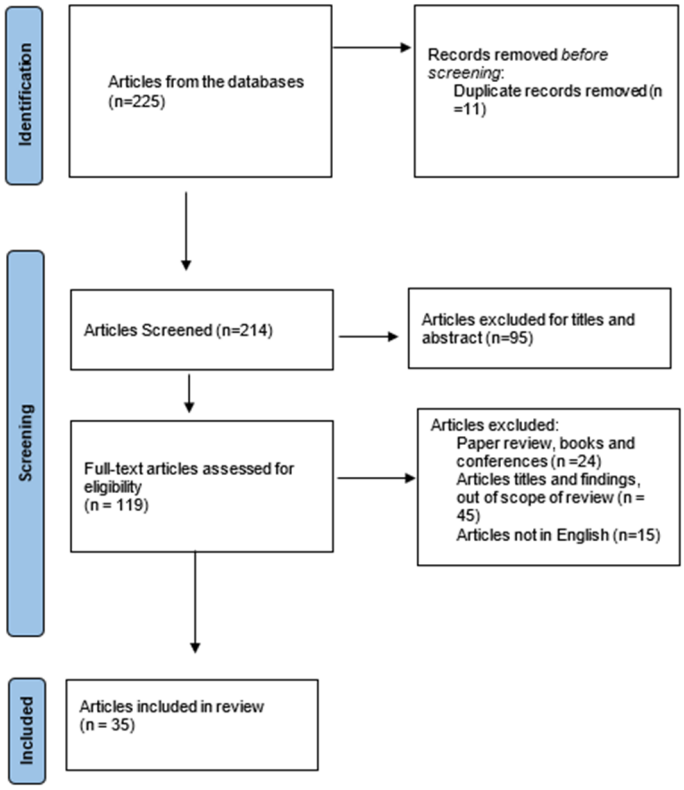

Figure 1. PRISMA Flow Diagram

2.2 Eligibility and Inclusion

To ensure a more precise selection process, research articles written in English were specifically chosen. Additionally, if published in reputable databases and search engines such as Scopus and Google Scholar, documents were included. In this review, we incorporated articles examining teachers' perspectives on using technology in language teaching and learning. Conversely, we excluded articles concentrating solely on the viewpoints of students and parents.

Including articles exploring teachers' perceptions was deemed essential, as the researcher considered their insights crucial for assessing and comprehending the preparedness of teachers to integrate technology into language teaching.

Consequently, this phase played a pivotal role in guaranteeing the reliability and high quality of the collected data. Most of the research featured quantitative findings, with some studies incorporating a qualitative analysis of the high-value integrated. Table 1 depicts the criteria for inclusion and exclusion.

Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Language	English	Non-English
Year published	2010-2023	Before 2010
Type of article	Peer reviewed journals	Books, book chapters, conferences
Perception	Teachers, teachers and students	Students and parents

2.3 Data Extraction

In this investigation, researchers utilized a standardized form for data extraction to gather and systematize pertinent information. The data extraction form encompassed various essential key aspects, such as the names of the authors, their country of origin, location of study, publication year, employed methodology, findings, teachers' perceptions, technology used in language education and the journals in which the studies were published (Komalasari et al., 2023). The researchers performed a descriptive examination to conduct a thematic analysis of the compiled data. This analysis aimed to uncover and present frequencies, percentages, and the emerging themes, concepts, and meanings inherent in the data. This methodology facilitated a comprehensive comprehension of the content and allowed for meaningful interpretations of the findings. Table 2 shows the data extraction.

Table 2. Data Extraction Table

S/N	Authors (Years)	Method	Tech used	Country of affiliation	Sample characteristics	Journal
1	Maja (2023)	Qualitative	Not specifically mentioned	South Africa	Ten EFL primary school teachers	Journal of Curriculum Studies Research
2	Zhang & Zou (2022)	Qualitative	Speech-to text and text-to-speech recognition, and digital-game-based learning	Hong Kong	No sample	Computer Assisted Language Learning
3	Chuah & Kabilan (2021)	Qualitative	Chatbots	Malaysia	42 ESL teachers	International Journal of Emerging Technologies in Learning
4	Bunting et al. (2021)	Qualitative	iPad, eBooks	Sweden	11 primary school teachers	International Journal of Child-Computer Interaction
5	Boonmoh et al. (2021)	Qualitative	Mobile-assisted language learning devices (MALL) and CALL, Tablets	Thailand	26 Thai secondary teachers	Computer-Assisted Language Learning Electronic Journal
6	Domínguez Romero & Bobkina (2021)	Qualitative	CALL	Spain	25 pre-service teachers from the Master's program at a university	Education and Information Technologies
7	Hazaea et al. (2021)	Qualitative	Not specifically mentioned	Saudi Arabia &	19 undergraduate English language	Computer-Assisted Language Learning

				Yemen	instructor	Electronic Journal
8	Choi & Chung (2021)	Qualitative	Not specifically mentioned	South Korea	seven EFL instructors at a South Korean university	Sustainability
9	Katemba (2020)	Mixed	CALL	Indonesia	30 English instructor teachers	Acuity: Journal of English Language Pedagogy, Literature and Culture
10	Khan & Kuddus (2020)	Quantitative	Not included	Bangladesh	100 secondary level English teachers	Rupkatha Journal on Interdisciplinary Studies in Humanities
11	Taghizadeh & Hasani Yourdshahi. (2020)	Mixed	Email, smartphones, tablets, CDs/DVDs, and podcast	Iran	95 young learner English language teachers	Computer Assisted Language Learning
12	Anggeraini (2020)	Qualitative	Laptop, speaker, mobile phones, websites	Indonesia	No sample	Research and Innovation in Language Learning
13	Mathew et al. (2019)	Qualitative	E-learning	India & Saudi Arabia	20 EFL University teachers	International Journal of English Language Teaching
14	Canals & Al-Rawashdeh (2019)	Mixed	Computer-Assisted Language Learning (CALL), E-Learning	Jordan & Spain	10 university English language instructors	Computer Assisted Language Learning
15	Khoshsima et al. (2018)	Qualitative	E learning and mobile application	Iran	15 language teachers in Higher school and college students	Journal of Applied Linguistics and Language Research
16	Kassem (2018)	Qualitative	Overhead projectors, Active Board, internet, Smart Phones	Egypt	One hundred and sixty-four English instructors, from different Saudi universities	International Journal of English Language Teaching
17	Mei et al. (2018)	Qualitative	Web 2.0	New Zealand and China	295 full-time preservice EFL teachers	Journal of Educational Computing Research
18	Mutambik (2018)	Qualitative	E learning	Saudi Arabia	24 university students and teachers	English Language Teaching
19	Ozer (2018)	Quantitative	E learning and CALL	Turkey	174 University, English language students	Journal of Language and Linguistic Studies
20	Andrei (2017)	Qualitative	Digital boards, overhead projectors for the digital boards, document cameras, laptops, desktops, iPods,	USA	Three ESL middle school teachers	Tesol Journal

			iPads,			
21	Yaman (2016)	Qualitative	Podcast	Turkey	No sample	Journal of educational and instructional studies in the world
22	Mohammed (2015)	Mixed	Computers, the Internet, Computer dictionary, Mobile dictionary, LCD projector, PowerPoint, DVD and CD-ROM	Turkey	No sample	Istanbul Aydin University Institute of Social Sciences
23	Çelik & Aytin (2014)	Qualitative	Not mentioned	Turkey	6 elementary and high school teachers	Tesl-Ej,
24	Al-Faki & Khamis (2014).	Qualitative	Interactive white board	Saudi Arabia	Elementary, intermediate, and secondary school English language teachers	American International Journal of Social Science
25	Li (2014)	Qualitative	CALL such as projector and PP	China	Eight secondary school teachers	System
26	Öz. (2014)	Qualitative	Interactive white board	Turkey	58 EFL teachers and 164 EFL students	TOJET: The Turkish Online Journal of Educational Technology
27	Sardegna & Dugartsyrenova (2014).	Qualitative	Blogs, wikis, e-portfolios, videotape recordings	USA & Russia	25 pre-service foreign language teachers	Foreign Language Annals
28	Golonka et al. (2014)	Qualitative	Not included	USA	No sample	Computer assisted language learning,
29	Hani (2014)	Qualitative	CALL	Jordan	200 English language teachers in Jordan	Theory and Practice in Language Studies
30	Borthwick & Gallagher-Brett (2014)	Qualitative	Not specifically mentioned	UK	No sample	Computer Assisted Language Learning,
31	Mollaei & Riasati (2013)	Mixed	CALL	Iran	Teachers' perceptions of using technology in teaching EFL	International Journal of Applied Linguistics and English Literature
32	Nomass (2013)	Qualitative	Computer assisted language learning programs, presentation software, electronic dictionaries, chatting and email messaging programs, listening CD-players, and learning	Iraq	No sample	English language and literature studies

			video-clips			
33	Saglam & Sert (2012)	Qualitative	E-learning	Turkey	Nine ELT instructors in a Preparatory school	Turkish Online Journal of Qualitative Inquiry
34	Hu & McGrath (2011)	Mixed	Not mentioned	China & Singapore	89 EFL University teachers	Technology, pedagogy and education
35	Wiebe & Kabata. (2010)	Mixed	CALL	Canada * 2	One hundred and fifty-six university students and five university instructors	Computer Assisted Language Learning

3. Results

3.1 Descriptive Analysis

The assessment of the articles under review involves examining their publication years, the authors' affiliated countries, study locations, and the journals where they were published. This information is presented in a descriptive manner. Figure 2 illustrates the publications of the reviewed articles categorized by year.

As depicted in Figure 2, the year 2014 recorded the highest number of articles, totalling 8, followed by 2021 with 6 articles. In the sequence, 2018 contributed 5 articles, 2020 had 4, and both 2019 and 2013 featured two articles each. The years 2023, 2022, 2019, 2017, 2016, 2015, 2012, and 2011 each had one article. It's crucial to emphasize that this investigation exclusively delves into teachers' perceptions and is limited to the realm of technology in language teaching. Consequently, the inclusion of articles in this analysis adhered strictly to these specified criteria.

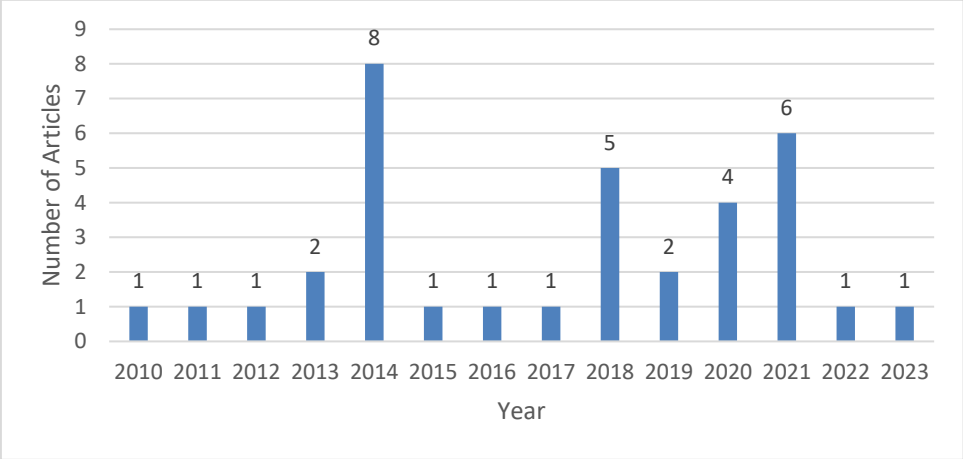

Figure 2. Year Wise Publication

A collective of 63 authors participated in the examined articles. Among them, four articles featured authors affiliated with institutions in multiple countries (Mathew et al., 2019; Canal & Al-Rawashdeh, 2019; Sardegna & Dugartsyrenova, 2014; Hu & McGrath, 2011), while the remaining articles had authors associated with institutions in a single country. Table 3 displays the authors' affiliations by country, along with the respective total number of authors from each country.

As indicated in Table 3, the United States leads with 8 authors affiliated with institutions in the country, followed by Iran with 7 authors. Saudi Arabia and Turkey closely trail with 6 authors each. It's important to clarify that this distribution of authors by country doesn't necessarily imply that the highest number of articles originates from the USA; rather, it reflects the distribution of authors based on their affiliations in the reviewed articles. Among the scrutinized articles, 28 employed qualitative or quantitative analyses to explore data to comprehend teachers' perspectives on integrating technology in language teaching and learning. Figure 3, presented below, illustrates the geographical locations of the studies.

Table 3. Authors Country of Affiliation

Country	Number of authors	Country	Number of authors
USA	8	Sweden	3
Jordan	1	Spain	3
Iran	7	Turkey	6
Malaysia	2	Egypt	1
Thailand	3	Indonesia	2
Saudi Arabia	6	China	2
New Zealand	1	Bangladesh	2
Russia	1	Canada	2
Hong Kong	2	Iraq	1
Jordan	1	India	2
Singapore	1	Yemen	1
South Africa	1	UK	2
Korea	2		

Turkey emerges as the frontrunner in the field of language education and technology, with an impressive 5 research articles. Saudi Arabia follows closely with 4 projects, and Iran contributes 3. The USA, Indonesia, and China each have 2, while several other countries in the chart have one each. Notably, as depicted in Figure 3, a substantial portion of the research on teachers' perceptions of technology in language teaching and learning is conducted in countries where English is not the first language, particularly in Asian countries. This trend underscores the global interest in enhancing English teaching and learning, aligning with the United Nations' Sustainable Development Goals (SDG) (Wong & Yunus, 2023).

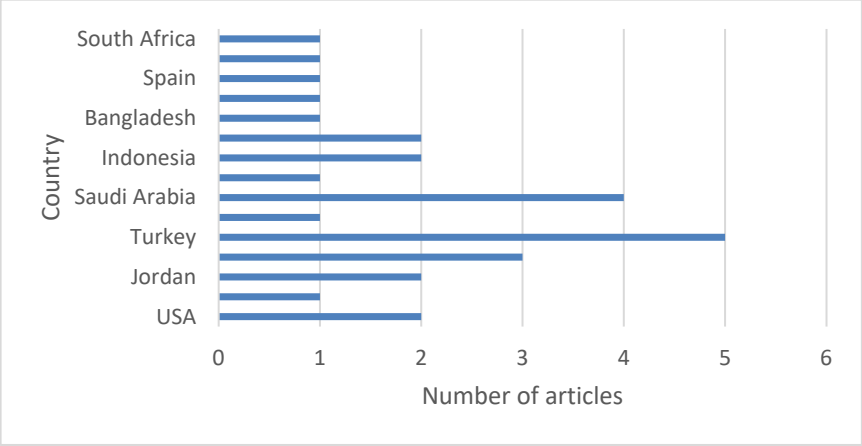

Figure 3. Location of Study

Table 4 displays the categorization of articles according to journals. The Computer-Assisted Language Learning Journal claimed the highest number of articles, totalling 6. At the same time, both the International Journal of English Language Teaching and the Computer-Assisted Language Learning Electronic Journal featured 2 articles each. The remaining journals each had one article.

Table 4. Distribution by Journals

Journals	Number of articles
Computer Assisted Language Learning	6
International Journal of English Language Teaching	2
Computer-Assisted Language Learning Electronic Journal	2
TESOL	1
International Journal of Child-Computer Interaction	1
Journal of Applied Linguistics and Language Research	1
International Journal of Applied Linguistics and English Literature	1
Turkish Online Journal of Qualitative Inquiry	1
International Journal of Emerging Technologies in Learning	1
Acuity: Journal of English Language Pedagogy, Literature and Culture	1
American International Journal of Social Science	1
System	1
Journal of Educational Computing Research	1
TOJET: The Turkish Online Journal of Educational Technology	1
Rupkatha Journal on Interdisciplinary Studies in Humanities,	1
Foreign Language Annals	1
English Language Teaching	1
Journal of Language and Linguistic Studies	1
English language and literature studies	1
Education and Information Technologies	1
Theory and Practice in Language Studies	1
Istanbul Aydin University Institute of Social Sciences	1
Tesl-Ej,	1
Journal of educational and instructional studies in the world	1
Research and Innovation in Language Learning	1
Technology, pedagogy and education	1
Journal of Curriculum Studies Research	1
Sustainability	1

3.2 Literature Classification

This analysis examines the methodology employed and explores teachers' perceptions and the prevalent technology discussed in the reviewed articles. As illustrated in Figure 4, 26 out of the examined articles, constituting 74%, utilized a qualitative methodology. Additionally, 7 articles, accounting for 20%, employed qualitative and quantitative methods, while 2 articles, making up 6%, exclusively utilized a quantitative methodology. The prevalence of the qualitative approach can be attributed to the inherent nature of the research topic. To gain a more nuanced understanding of teachers' perspectives on the integration of technology in language teaching and learning, qualitative data were collected through interviews and questionnaires.

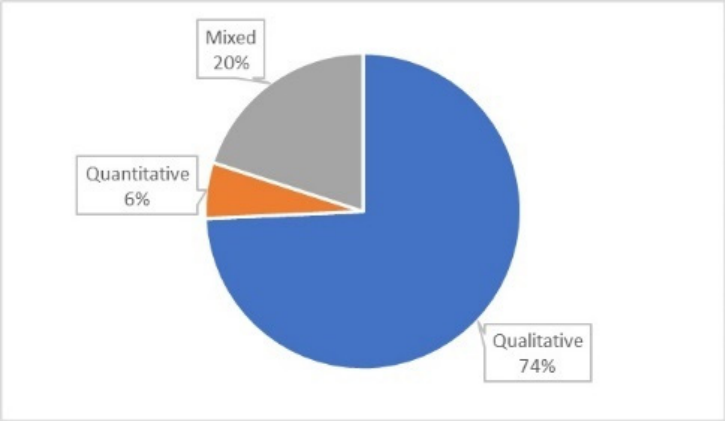

Figure 4. Distribution by Methodology

Table 5. Teachers' View on Technology in Language Teaching and Learning

Authors	View		
	Positive	Mixed	Negative
Andrei (2017)	✓		✓
Bunting et al. (2021)	✓		✓
Canals & Al-Rawashdeh (2019)		✓	✓
Taghizadeh & Hasani Yourdshahi (2020)	✓		✓
Khoshsima et al. (2018)	✓		✓
Mollaei & Riasati (2013)	✓		✓
Saglam & Sert (2012)	✓		✓
Chuah & Kabilan (2021)	✓		✓
Kassem (2018)		✓	✓
Boonmoh et al. (2021)	✓		
Katemba (2020)	✓		✓
Mei (2018)	✓		
Öz. (2014)	✓		✓
Khan & Kuddus (2020)	✓		
Sardegna & Dugartsyrenova (2014)	✓		✓
Wiebe & Kabata. (2010)	✓		✓
Ozer (2018)	✓		✓
Mohammed (2015)	✓		✓
Çelik & Aytin (2014)	✓		✓
Anggeraini (2020)	✓		✓
Maja (2023)	✓		✓

Table 5 illustrates teachers' perspectives on incorporating technology in language teaching and learning. These perceptions are categorized into three groups. Firstly, some with a positive outlook believe that integrating technology into language education holds promise and can simplify their teaching methods. Secondly, individuals with a negative perspective argue that technology does not enhance their teaching and prefer not to utilize it. Lastly, there are those with mixed reactions, acknowledging the potential impact of technology on the pedagogical process of language teaching and learning but remaining uncertain about its overall efficacy (Liu et al., 2017). Furthermore, the study identifies teachers who encounter challenges when utilizing technology.

Table 6. Percentage of Teachers View

Teachers view	Number of articles	Percentage
Positive	19/21	90.5%
Negative	2/21	9.5%
Challenges	19/21	90.5%
Positive & challenges	17/19	89.5%

Among the 21 articles exploring teachers' perceptions of technology integration in language education, 19 reflected a positive outlook, while 2 exhibited mixed reactions. Nevertheless, nearly all the studies identified challenges teachers face in utilizing technology, indicating that these challenges were prevalent across the examined literature. The examined articles emphasize the application of various forms of technology and technological resources in language instruction and acquisition. Table 7 itemizes the range of technologies utilized in language education, with all the specified technologies being chosen from the articles under review.

The items listed under technology encompass broader categories that support various functions. At the same time, those technological tools used in language teaching and learning are specific devices or platforms designed for language education purposes. Both categories contribute to the integration of technology in language teaching and learning.

Table 7. Technology Used in Language Learning and Teaching

Technology	Technological tools
Network technology	Course/learning management system (CMS)
Internet	Interactive whiteboard (IWB)
Web 2.0	ePortfolio
Computers	Intelligent tutoring system
Computer dictionary	Automatic speech recognition (ASR) and pronunciation program
Mobile dictionary	Social networking
DVD and CD-ROM	Blog
PowerPoint	Tablet PC or PDA
LCD projector	iPod
Speaker	Cell phone or smartphone
Websites	CD-Players
	Digital boards
	Overhead projectors for digital boards
	Document cameras
	Laptops
	Desktops
	iPads
	eBooks
	E-Learning
	Email
	Smartphones
	Tablets
	CDs/DVDs
	Podcast
	E-learning and mobile application
	Chatbots
	Overhead projectors
	Active Board
	Smart Phones
	Mobile-assisted language learning devices (MALL)
	MP3 players
	Laptops and notebooks
	Course/learning management system (CMS)
	Blackboard Learn

4. Discussion

This discussion explores the following discoveries to address the research questions that served as the objectives of this study. A comprehensive analysis of thirty-five journal publications focusing on the utilization of technology in language teaching and learning was conducted. The examination encompassed teachers' perspectives on technology use, the various types of technology employed, the advantages of integrating technology into language education, the obstacles faced, and viable approaches for sustainable integration.

4.1 Teachers' Views on the Role of Technology in Language Teaching and Learning

As evident from the findings, among the 35 articles examined in this research, approximately 60% (21 articles) conducted investigations to explore educators' perspectives on integrating technology into language learning and teaching. Among these 21 studies, 19 revealed that teachers generally held a positive attitude, believing technology could enhance learning and teaching experiences. The remaining two articles presented conflicting views regarding the use of technology in language teaching and learning. Canal & Al-Rawashdeh (2019) found in their research that teachers believe there are greater advantages in employing technology for receptive skills (listening, reading)

compared to productive skills (speaking, writing). The findings indicate that integrating technology holds significant potential for enhancing listening and reading skills, whereas it provides limited or no assistance for improving speaking and writing skills. According to Kassem's (2018) study, there was a varied response to this problem. While some teachers acknowledged that technology had altered teaching techniques and styles, others disagreed, arguing that technology had no bearing on education.

The consensus among all other articles indicates a positive perspective on incorporating technology into language teaching and learning. Nevertheless, nearly all the articles identified various challenges associated with technology implementation. The study conducted by Sardegna & Dugartsyrenova (2014) found that despite the challenges associated with technology and the participants' preferences for other coursework activities, the technology-based activities offered more opportunities for in-depth conversations, peer feedback and reflection; they also helped participants develop their sense of learner autonomy and community by modelling effective technology use and encouraging a deeper appreciation of technology-enriched practices. The survey findings by Katemba (2020) suggest that the surveyed teachers favour the educational values that technologies/ICTs bring to students in learning English. The positive attitudes expressed by the teachers towards technology use in teaching reinforce the notion that technology is considered an important and beneficial aspect of successful teaching in the context of English language education. The three educators in Andrei's (2017) study thought they were proficient with the newest technologies accessible. Teachers' comfort level with technology is a critical component of classroom technology integration, as they are more likely to design lessons that use it if they feel confident using it in the classroom.

Regarding the language educators of young learners, Taghizadeh & Hasani Yourdshahi's (2020) study found an overall favourable trend among them to integrate technology into their lessons for young learners. Other findings showed that teachers who participated in the survey had favourable opinions regarding the contribution of educational technology to improving language instruction (Bunting et al., 2021; Khan & Kuddus, 2020; Saglam & Sert, 2012).

Examining educators' perspectives on incorporating technology into language learning and reading encompassed an exploration of diverse technologies and technological tools. The study conducted by Khoshsima et al. (2018) on online language instruction demonstrated that teachers' attitudes and methods of online cooperation were favourable toward the online course because of its distinctiveness and beneficial impacts on the learning process. According to Chuah & Kabilan's (2021) research, educators found that using chatbots to provide feedback to their pupils was highly beneficial. They also believed that students might practice the target language using chatbots to mimic an interaction cycle. Additionally, the teachers felt that chatbots enhanced social presence to a larger extent, finally fostering an environment in which their students are engaged. According to the poll results, instructors were generally enthusiastic about the role of computer-assisted language learning tools (Mei et al., 2018; Wiebe & Kabata, 2010). Overall, instructors' opinions on interactive whiteboard technology and its advantages in English foreign language classrooms are positive (Öz, 2014). The data gathered for Ozer's (2018) study illustrates the favourable opinions that aspiring English language instructors hold on using computers in language instruction. Furthermore, the research findings by Mollaei & Riasati (2013) demonstrate that educators have favourable opinions toward technology usage, especially computers.

4.2 Benefits of Incorporating Technology into Teachers Teaching Methods

Effective utilization of technology in language teaching and learning yields significant advantages. Examining various articles, it is evident that the positive outcomes of incorporating technology in language teaching encompass enhanced lesson delivery by teachers, the development of tailored learning materials, and the professional growth of educators. Similarly, integrating technology in language learning yields benefits such as heightened student engagement, improved comprehension, and the provision of content for practical language application.

In improving lesson delivery, the primary rationale for integrating technology into language education is to enhance learning through a well-organized teaching approach. The usage of interactive whiteboards as a technological tool to improve language education instruction has recently increased. Al-Faki & Khamis (2014) claim that interactive whiteboards allow teachers to combine in-person engagement with online learning to create a dynamic learning environment that enhances how students receive their lessons. Li's (2014) study revealed that technology tools like PowerPoint are utilized to show texts, visuals, and exercises for language systems (phonological units, vocabulary, grammar, and discounts to enhance class presentation). Lesson presentation involves more than just. Through chatrooms, e-learning also enables students to converse with others worldwide in a way that is comparatively simpler, more adaptable, and more involved (Mutambik, 2018).

By customizing materials, teachers aim to create a more inclusive, engaging, and effective learning environment that

meets the diverse needs of their students. According to Li (2014), every instructor in the survey created personalized materials using technology, namely the Internet and courseware apps. It entails creating activities, such as matching exercises, gap filling, and true-false questions, and including extra language resources. Al-Faki & Khamis (2014) also claimed that interactive whiteboard use might support various learning styles because teachers could access various resources to meet specific needs.

Given that the focus of the review revolves around the perspective of teachers, it is crucial to acknowledge the positive impact of technology on the professional development of educators. All eight teachers in the study of Li (2014) used various forms of technology for their professional development purposes. It was achieved through collaboration in lesson preparation, sharing materials and researching new ideas for teaching. The research findings indicated that integrating technology into language teaching and learning can also contribute to improving teachers' professional development. Zhang & Zou (2022) asserted that lifestyle changes and technological advancements in language teaching could reveal the shift in instructional frameworks from fixed to flexible and from teacher-centred to learner-centred, ultimately leading to more effective methods. This knowledge equips teachers to adapt to the evolving educational landscape and enhance their students' language education quality. The positive perception of learning objects in inverted instructional settings offers opportunities for teachers' professional development by encouraging them to embrace innovative, student-centred approaches, enhance their technological competencies, and adapt to evolving trends in educational technology (Domínguez Romero & Bobkina, 2021).

Educators aim to improve their students' learning outcomes as their primary goal. Consequently, the advantages of incorporating technology in language learning consistently prioritize the well-being and progress of students. A notable advantage highlighted in several reviewed studies is that technology can enhance student engagement in language education. The results of Mathew et al. (2019) study indicated that Blackboard Learn, a technology tool employed in language teaching and learning, can potentially establish a comfortable and stress-free environment for learners in virtual teaching-learning scenarios. According to Hani (2014), computer-assisted language learning can increase interaction and the use of language as a communication tool.

Conversely, teachers have reported that technical resources are very successful at holding students' attention (Çelik & Aytin, 2014). It was noted that educators were using technology in every classroom in a study conducted by Li (2014) to inspire and involve students. Videos, audio (such as music), and images were commonly employed, especially during the lead-in and presentation phases. The interactive whiteboard enhances learner engagement by allowing them to actively interact with the materials displayed. It offers increased classroom participation and discussion opportunities, particularly when compared to alternative methods (Al-Faki & Khamis, 2014).

Another crucial advantage highlighted in the studies is the improvement of student comprehension. Hani (2014) suggests that computer-assisted language learning could result in the integration of the four skills of speaking, reading, writing, and listening, all of which are essential for improving students' language comprehension. Teachers who took part in the study of Sardegna & Dugartsyrenova (2014) found that technology-based activities gave students more chances for richer and varied interactions, peer feedback, and reflection. They also helped them develop their sense of learner autonomy and community belonging. Li's (2014) study noted that teachers utilized technology in every lesson to engage and excite their students. Videos, audio (such as music), and images were regularly incorporated, especially during the lead-in and presentation phases. Interactive whiteboards allow able to see their work on the board as learning techniques involve visual rather than verbal instruction. Furthermore, it draws students' attention and promotes their engagement with the material (Al-Faki & Khamis, 2014).

Li's (2014) study exemplifies utilizing technology for practical language application. Two teachers incorporated technology to create a context for language use among students. Mei, one of the teachers, employed technology during the consolidation stage of her lesson. She presented images of Martin Luther King's birthplace, family background, and a list of keywords to establish a contextual framework for students to engage in discussions about him. Controlling classroom procedures and activities is another benefit of technology (Hani, 2014).

4.3 Challenges or Concerns of Using Technology in Language Teaching and Learning

The examination of various articles has brought to light several obstacles impeding the adoption of technology by language teachers. These challenges, categorized as pedagogical and technical, pose significant barriers. Pedagogical challenges pertain to difficulties or hindrances associated with the methods, strategies, and approaches employed in language teaching and learning. On the other hand, technical challenges involve difficulties or obstacles stemming from the technical aspects of implementing, maintaining, or utilizing specific technologies. Despite holding positive attitudes toward incorporating technology in language education, the teachers involved in the study should have extensively integrated technology into their English language teaching. Moreover, the limited use of technology was

attributed to various barriers (Mohammed, (2015).

An essential finding from this review highlights that the difficulties encountered by teachers vary from one country to another and from one region to another. This is evident in the study conducted by Hazaea et al. (2021), where their research spanned high-tech and developed countries, including Saudi Arabia and Jordan, as well as two low-tech and developing countries, namely Libya and Yemen. The findings illustrate that challenges vary across different contexts. In low-tech countries like Yemen and Libya, challenges primarily stem from a need for more technological availability. This includes issues such as insufficient power supply, inadequate technological infrastructure, limited Internet services, and a scarcity of smartphones.

Conversely, high-tech countries like Saudi Arabia and Jordan encounter various challenges, falling into technical and pedagogical categories. Despite possessing advanced technological infrastructure and facilities, these countries must overcome certain technical challenges. These nations' technical issues are centred around technology-related and user-related concerns.

The principal obstacles to integrating technology into language teaching and learning predominantly concern pedagogical challenges. The pedagogical difficulties elucidated in the study encompass a variety of issues, including unequal access to facilities among students (Boonmoh et al., 2021; Taghizadeh & Hasani Yourdshahi, 2020; Katemba, 2020; Li, 2014), teachers' insufficient skills, lack of support from the administration (Boonmoh et al., 2021; Taghizadeh & Hasani Yourdshahi, 2020; Al-Faki & Khamis, 2014; Hu & McGrath, 2011), teachers' lack of confidence (Boonmoh et al., 2021; Taghizadeh & Hasani Yourdshahi, 2020; Katemba, 2020; Li, 2014), absence of proper training (Boonmoh et al., 2021; Taghizadeh & Hasani Yourdshahi, 2020; Katemba, 2020; Mohammed, 2015), inadequate preparation time (Boonmoh et al., 2021; Katemba, 2020), high workload (Boonmoh et al., 2021), teachers' beliefs (Boonmoh et al., 2021), and negative attitudes among teachers (Katemba, 2020). Barriers to the effective use of technology in language education include concerns about potential technological malfunctions and instances of equipment failure (Andrei, 2017). Additionally, challenges arise from a lack of technical support (Katemba, 2020; Al-Faki & Khamis, 2014; Hani, 2014), as well as issues related to internet connectivity (Mohammed, 2015; Hani, 2014; Hu & McGrath, 2011).

4.4 Sustainable Framework to Meet the Unique Needs and Concerns of Language Educators for Adopting Technology into Language Teaching and Learning

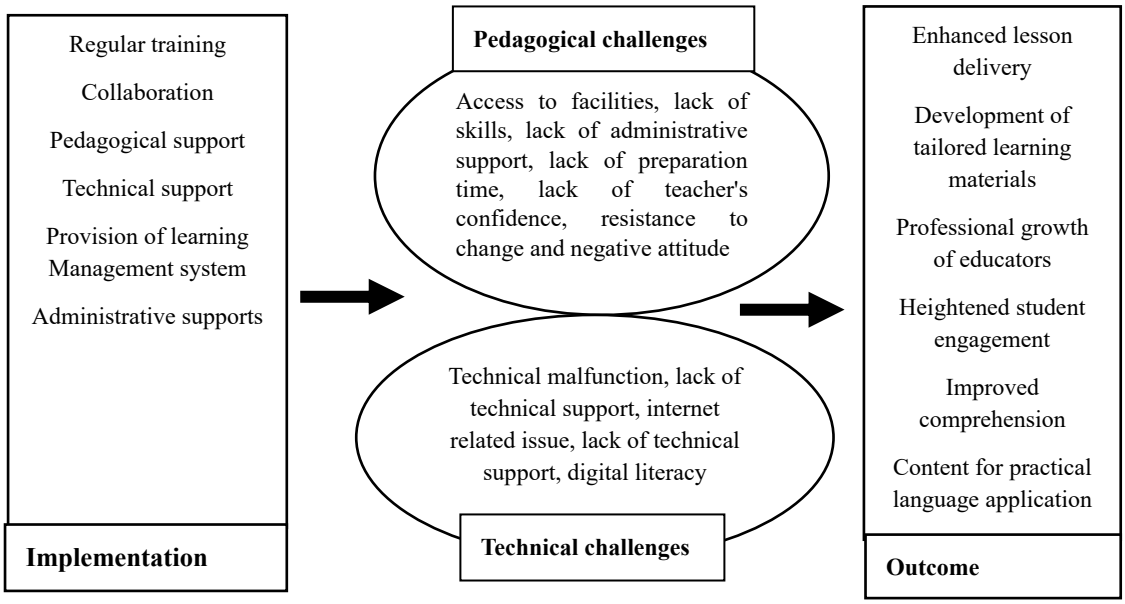

Figure 5. Framework for Sustainable Technology Integration in Language Learning and Teaching

As demonstrated in the preceding section, among the 21 articles exploring teachers' perspectives on incorporating technology in language teaching and learning, 90.5% reflected a positive outlook. This suggests that most teachers believe in the potential enhancement and effectiveness of learning through technology. However, nearly 90% of those positively acknowledged encountering challenges and barriers in using technology for language teaching and

learning. Consequently, there is a pressing need for a sustainable framework to address these challenges, overcome barriers, and ensure the continual and effective integration of technology in language education.

A framework designed to address the unique needs and concerns of language educators for adopting technology into language teaching and learning must emphasise the adaptability and customization of solutions to cater specifically to the requirements of language educators in other to reflect the idea of creating a harmonious integration between technology and language education that is sustainable and responsive to educators' needs. Teachers need to develop the expertise to effectively incorporate technology into their classrooms, as emphasized by Kassem (2018). To achieve this, educators should proactively engage in training to enhance their readiness for integrating technology and promoting meaningful student involvement (Ozer, 2020; Al-Faki & Khamis, 2014). Sustainable integration of technology into language education necessitates comprehensive educational support. This encompasses the appropriateness of language teaching programs, administrative attitudes, resource availability, and opportunities for training (Hazaea et al., 2021; Çelik & Aytin, 2014).

Canal & Al-Rawashdeh (2019) further advocate for providing e-learning training and strategies to enable faculty to effectively engage with online teaching methods. Adequate preparation time for faculty is deemed crucial, and continuous support is paramount beyond just two orientation sessions. Sustained technological support throughout the utilization of technology is essential for long-term success in integrating technology into language education. An integral, sustainable approach to promote the ongoing use of technology in language learning and teaching involves fostering collaboration among teachers to facilitate knowledge exchange. Anggeraini (2020) underscores the active involvement of teachers in professional development activities like group discussions, workshops, training sessions, and seminars to stay abreast of advancements in new technologies. Advocating for a sense of collective responsibility among language educators is crucial to encourage their participation in sustained professional dialogues. Choi & Chung's (2021) research indicates that instructors who engaged in self-initiated professional communities found them highly beneficial. Collaboratively, they reflected on their online teaching experiences and devised practical solutions and strategies to enhance the interactivity and engagement of their online classes.

5. Conclusion

In conclusion, this systematic review delved into the perspectives of teachers regarding technology's role in language teaching and learning, aiming to establish a sustainable adoption framework. The educational landscape has undergone significant transformation due to the pervasive influence of technology, emerging as a pivotal component in the teaching domain. Out of 225 identified peer-reviewed articles, 35 were meticulously selected for this review. Noteworthy findings underscored that 90% of articles concentrating on teachers' attitudes toward technology in language education exhibited a positive outlook. These teachers believed in the potential of technology to enhance both learning and teaching, signalling a readiness for its integration. However, despite this optimistic stance, around 90% of those with favourable views encountered challenges in effectively incorporating technology into their teaching practices. Recognizing these challenges, a sustainable framework was proposed to address the identified needs and provide solutions, which include regular training, collaboration among teachers, pedagogical support, technical support, provision of a learning management system and administrative support. Considering the complexities outlined in the reviewed articles, this framework is designed to guide educators in seamlessly integrating technology into language education. Doing so aims to bridge the gap between positive perceptions of technology and the practical challenges educators face, fostering a more effective and sustainable implementation of technology in language teaching and learning. It is crucial to acknowledge that this study exclusively examines articles centring on teachers' viewpoints in language teaching and learning, with no inclusion of perspectives from other stakeholders such as students and parents. Additionally, some reviewed articles feature studies conducted with only two teachers, a sample size too limited to draw comprehensive conclusions on a broader scale. Furthermore, the studies within this review span various countries, suggesting that challenges faced by teachers in one country may only sometimes be universally applicable to others.

6. Practical Implications

Based on the research results, the implications of this research are 1) Professional Development Initiatives: educational institutions and authorities can design professional development programs to improve technology skills and teacher self-confidence. Workshops and training sessions should focus not only on technical aspects but also address specific challenges identified in the study; 2) Curriculum Design and Assessment Practices: Curriculum designers can incorporate technology-enhanced activities into language courses, aligning them with the pedagogical strategies

highlighted in this research. Assessment practices must be adapted to accommodate technology, ensuring that evaluation methods are fair, valid, and aligned with learning objectives; 3) Implementation of the Sustainable Framework: Educational institutions and policymakers can adopt the proposed sustainable framework as a guide for integrating technology in language education. This framework can serve as a practical tool for decision-makers to systematically address identified challenges; 4) Continuous Feedback and Evaluation: Establishing a continuous feedback mechanism from teachers can provide input for ongoing adjustments to the sustainable framework. Regular evaluation of the effectiveness of technology integration initiatives should be conducted to identify areas for improvement and refinement; 5) Community Building and Collaboration: Creating communities of practice or online forums where teachers can share experiences, resources, and solutions can facilitate collaboration and mutual support. Encouraging collaboration within institutions and across various language education settings can enrich the collective knowledge base; and 6) Policy Formulation and Advocacy: Policymakers can use the findings of this study to inform the formulation of policies that support the integration of technology in language education. Advocacy efforts can emphasize the importance of ongoing support and recognition of educators' challenges in adopting technology.

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