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Teaching Pedagogies Using ICT in University Academic English Writing Across the Globe—A Systematic Literature Review

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Abstract. Mastery of academic English writing is crucial for success in higher education and can significantly enhance career prospects. With the increasing integration of information and communication technology (ICT) into teaching pedagogies across various fields, ITC's potential to foster effective instruction and create dynamic learning environments has become evident. However, research on ICT-integrated pedagogies in academic English writing remains limited. This study addressed this gap by conducting a systematic literature review to explore the impact of ICT- integrated pedagogies on academic English writing instruction. Adhering to the preferred reporting items for systematic reviews and meta-analyses guidelines, the systematic literature review process involved the identification, screening, and inclusion of studies from three major databases: Web of Science, Education Resource Information Center, and Scopus. A total of nine relevant articles, published between 2020 and 2024, available in open access, and written in English, were analyzed. The findings identified 11 common ICT-enhanced teaching pedagogies and eight frequently used ICT tools in academic English writing instruction. These pedagogies were found to enhance cognitive expression, optimize teaching effectiveness, and create engaging learning environments. The challenges faced by both instructors and students were also noted. The insights from this study offer valuable implications for academic English writing educators seeking to integrate ICT into their teaching practices.

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1. Introduction

In recent decades, the internationalization of education has significantly shaped the global academic landscape, marked by the growing prominence of English medium instruction in higher education (Coleman et al., 2018; Galloway & Rose, 2021; Macaro et al., 2018). Within the context of English medium instruction, academic English writing (AEW) plays a critical role in higher education. The term "academic" pertains to higher education and university-level careers (Russell & Cortes, 2012), and proficiency in AEW at the tertiary level is essential for students to succeed (Al-Zubaidi, 2012). However, mastering AEW presents a particularly complex and challenging endeavor for English as a foreign language (EFL) students (Marina et al., 2022). This is because AEW requires students to engage in deep processing of information (Ferris & Hedgcock, 2023) in order to produce reasoning and generate new ideas critically and clearly (Ondrusek, 2012). It underscores the need for effective pedagogical strategies to support EFL students in developing the advanced cognitive and linguistic skills required for AEW.

It is evident that teaching AEW presents numerous challenges. Firstly, developing academic writing skills necessitates not only the organization of ideas (Rafik-Galea et al., 2012) but also the ability of students to generate concepts that are aligned with specific academic conventions. Furthermore, research indicates that these students often lack essential skills, including evaluating and citing source materials, synthesizing theories and scientific literature (Walter & Stouck, 2020), and familiarity with scholarly conventions in scientific writing (Jeyaraj, 2020). Additionally, a study by Zotzmann and Sheldrake (2021) revealed that second language (L2) students showed lower levels of confidence and less favorable beliefs regarding their writing abilities compared to L1 students. Given these multifaceted challenges, it is imperative to explore innovative pedagogical approaches that can address the needs of EFL students and enhance their academic writing proficiency.

One promising avenue for addressing these challenges is the integration of information and communication technology (ICT) into teaching practices. The rapid development of ICT has positioned Blended Learning (BL) as a primary concern for educators (Ghavifekr et al., 2014). According to Ghavifekr et al. (2014), this prominence is attributed to its ability to create an engaging and dynamic teaching and learning environment. They support incorporating ICT into daily instructional practices. Various teaching approaches, including distance learning, e-learning, and more recently, blended learning, have been developed for this purpose, with many universities adopting these approaches to enhance students' writing ability (Aladwan et al., 2018). Furthermore, organizations such as UNICEF, UNESCO, and other global institutions are actively devoted to enhancing teaching through the integration of ICT into

curricular frameworks (Jara, 2021). As global educational institutions aim to equip students for a technology-centered future, the integration of AI-powered ICT tools has become essential, which emphasizes purposeful, engaging, and meaningful learning.

Despite ICT tools offer promising potential to enhance academic writing instruction, research using a systematic literature review (SLR) of the implementation of AEW teaching remains limited. Existing studies have primarily focused on perceptions towards ICT use (Cohen et al., 2017; Salonen et al., 2017; Van De Oudeweetering & Voogt, 2018), its influence on academic performance (Al-Maroof et al., 2021; Genlott & Grönlund, 2016), its impact on learners' motivation (Ramalingam et al., 2022; Sahlin et al., 2017; Siddiq et al., 2017), and issues related to proficiency in ICT and accessibility to ICT resources (Goh & Kale, 2016; Haleem et al., 2022). There is a significant paucity of studies that systematically analyze the teaching pedagogies incorporating ICT, their effectiveness, and the challenges faced in AEW instruction.

To provide a strong theoretical foundation for analyzing the integration of ICT into AEW instruction, this study employs the technological pedagogical content knowledge (TPACK) framework developed by Mishra and Koehler (2006). The framework further highlights the intersections of these domains—technological content knowledge, technological pedagogical knowledge, and pedagogical content knowledge, culminating in TPACK, which represents the effective integration of technology, pedagogy, and content in teaching. In this study, TPACK is particularly relevant for analyzing the use of ICT in AEW instruction, as it examines how educators balance their knowledge of writing content, pedagogical strategies, and digital tools to enhance student learning outcomes.

In addition, to ensure a rigorous and transparent review process, this study adopted the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement published in 2020 (Page et al., 2021). This guideline served as an updated framework for reporting systematic reviews, expanding upon the foundational PRISMA statement initially published in 2009. It comprises a comprehensive 27-item checklist, accompanied by a flow diagram (the PRISMA flowchart), to facilitate structured reporting, which guide researchers in documenting each stage of the systematic review process, from study identification and screening to data synthesis and reporting. Compared with PRISMA 2009, the PRISMA 2020 statement broadens its applicability to include a diverse array of study designs, thereby enhancing the potential for replication and review updates. Additionally, it promotes the integration of systematic reviews into overviews and guidelines, allowing research teams to build upon existing work and reduce unnecessary duplication of effort (McKenzie & Brennan, 2017; Page et al., 2018; Wayant et al., 2019).

Consequently, this study conducted a SLR following PRISMA 2020 guidelines to examine ICT-integrated teaching pedagogies, tools, and their associated benefits and challenges in AEW. This study sought to provide educators with practical

insights for effectively incorporating ICT tools into their teaching practices, thereby enhancing students' academic writing skills.

2. Research Questions

This SLR focused on teaching pedagogies that utilize ICT and their impact on AEW teaching. This review explored ICT-integrated teaching pedagogies and tools in the AEW field, examining their benefits and challenges. Four research questions were developed as follows.

RQ1: What ICT-integrated teaching pedagogies enhance AEW skills at universities?

RQ2: What ICT tools are used to improve undergraduate students' writing performance in AEW classes?

RQ3: What are the advantages of ICT-integrated teaching pedagogies in AEW classes?

RQ4: What challenges arise in ICT-integrated teaching pedagogies for AEW?

3. Research Methods

This SLR employed the PRISMA 2020 guideline, employing a qualitative research approach to synthesize existing studies. It consisted of three phases: identification, screening, and inclusion (Page et al., 2021). Figure 1 depicts the clear process of how articles were identified, screened, and included.

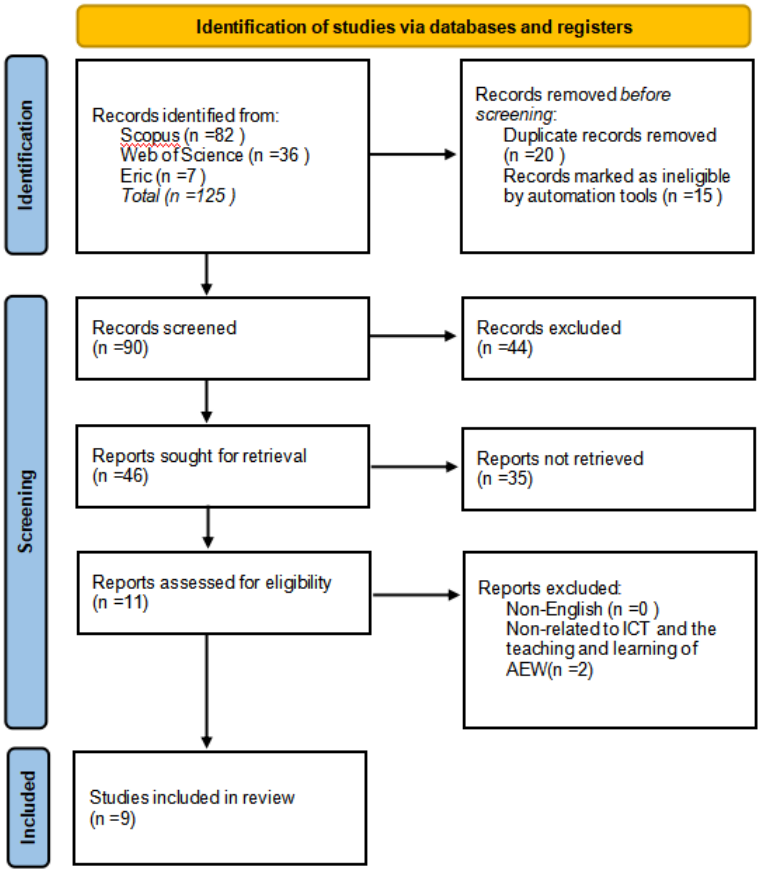

Figure 1: PRISMA flow chart

3.1 Phase 1: Identification

As shown in the PRISMA 2020 guidelines, the initial step of a SLR is identification. In this regard, the researcher selected three databases, namely Web of Science (WoS), Education Resource Information Center (ERIC), and Scopus, which are known for their rigorous indexing standards, which ensured that the sources included were of high quality and relevance and provided comprehensive and specialized educational researches (Baas et al., 2020; Birkle et al., 2020; Tauber, 1985). The exclusion of other well-known databases, such as Google Scholar and ScienceDirect, was based on specific limitations, such as lacking rigorous quality control and introducing redundancy of data. Therefore, to ensure methodological rigor and avoid duplication, only Scopus, WoS, and Eric were selected for this review.

In this SLR, keywords were carefully formulated to identify studies pertaining to the pedagogical approaches involving ICT in teaching AEW at the tertiary level. Table 1 provides a summary of the search string used in this study, along with the 125 identified articles using three databases. In this step, non-English studies were considered before being ruled out. In addition, 20 duplicate articles were found to be removed, and 15 ineligible records were checked by automation tools.

Table 1: Search string used in this study

Search String	Documents Obtained
("teaching pedagogies" OR "teaching methods" OR "instructional strategies" OR "teaching approaches") AND ("ICT" OR "educational technology" OR "digital tools") AND ("academic writing" OR "academic English writing" OR "university academic English writing")	WoS(36)
	Scopus(82)
	ERIC(7)

3.2 Phase 2: Screening

During the search for relevant studies across the three databases, 90 articles were screened according to the established inclusion and exclusion criteria, as detailed in Table 2. They were established to ensure the selection of pertinent and high-quality studies for this research. The criteria stipulated that only peer-reviewed journal articles published between 2020 and 2024, written in English, and available through open access were included. The studies had to address teaching pedagogies specifically using ICT and the teaching of AEW. Therefore, 44 articles were excluded.

Table 2: Inclusion and exclusion criteria of this study

Criteria	Inclusion	Exclusion
Article Type	Journal articles	Review articles, books, conference proceedings
Accessibility	Free access	Not free access
Publication Year	2020-2024 (5-year period)	<2020
Language	English	Non-English
Content	Related to teaching pedagogies using ICT and the teaching of	Non-Related to teaching pedagogies using ICT and the

	AEW	teaching of AEW

As a result, 46 articles were selected in this SLR after the first step of screening. These articles were then screened according to their titles and abstracts to confirm their relevance to the field of ICT in AEW field; 23 articles were yielded that were deemed eligible for further evaluation. After applying content-based screening criteria, 11 articles remained, which were highly reliable data for this study. Subsequently, two articles were excluded during the quality assessment, as detailed in Table 3, due to non-related to ICT and the teaching and learning of AEW.

Table 3: Quality assessment checklist

S/N	Criteria	Description checklist	Grading of response
QA1	Is the objective of the study clearly described ?	No, the objective is not described; Partially, the objective is not clearly described; Yes, the objective is well-described and clear.	(Yes, Partial, No) 〔1, 0.5, 0〕
QA2	Does this article present a study combining ICT to teach AEW?	No, ICT is not combined; Partially, ICT is combined but not for AEW; Yes, ICT is combined.	(Yes, Partial, No) 〔1, 0.5, 0〕
QA3	Does this article include AEW teaching?	No, this study does not include AEW teaching; Partially, this study describes writing teaching but not for academic purposes; Yes, this study includes AEW teaching.	(Yes, Partial, No) 〔1, 0.5, 0〕
QA4	Does this study describe the findings clearly and in detail?	No, the findings are not described clearly and in detail; Partially, the findings are described clearly but not in detail; Yes, these findings are described clearly and in detail.	(Yes, Partial, No) 〔1, 0.5, 0〕

The reasons for their exclusion because of an insufficient description of the study's rationale, inadequate integration of ICT in the field of AEW instruction, and a lack of clear and detailed presentation of findings.

3.3 Phase 3: Included

After completing the screening process, nine articles were included in this SLR. The objective of this SLR was to explore the impact of teaching pedagogies using ICT in the AEW field. In the subsequent sections, the findings of the studies have been discussed thoroughly and the four research questions were answered based on the results.

4. Results

This study created an SLR that analyzed numerous articles published between 2020 and 2024, adhered to the specified search string across three primary databases—namely, WoS, ERIC, and Scopus—and identified a significant research gap concerning the impact of ICT on pedagogical approaches in AEW. The selection of this time frame facilitated incorporating recent research, thereby filling out the deficiencies in updated information identified in earlier studies. Through a quantitative analysis of the data, this study offered a comprehensive synthesis that ICT can enhance AEW ability.

RQ1: What ICT-integrated teaching pedagogies enhance AEW skills at universities?

Table 4: Teaching pedagogies incorporating ICT in academic English writing

Reference	Teaching pedagogies incorporating ICT	Support
AlMarwani, 2020; Pitura, 2022; Xue et al., 2023	Collaborative Writing	Google Docs; Microsoft Word; Rain Classroom platform; Google Classroom
AlMarwani, 2020; Martínez Lirola, 2022; Pitura, 2022	Blended Learning	Mobile learning (M-learning) and Mobile Assisted Language Learning (MALL)； Virtual Learning
Nazari et al., 2021	Writing Analytics and Feedback	Automated Writing Evaluation (AWE), Automated Essay Scoring (AES), and Automated Written Corrective Feedback (AWCF)
Benzie & Harper, 2020; Martínez Lirola, 2022; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024; Xue et al., 2023	Online Feedback	Giving feedback; formative and summative assessment
Amirjalili et al., 2024; Koralage et al., 2023; Martínez Lirola, 2022; Pitura, 2022	Use of Social Media	Blogs; Facebook, Twitter, WhatsApp or Instagram；ChatGPT; Yahoo, Google
Benzie & Harper, 2020; Koralage et al., 2023	Flipped Classroom	Massive Open Online Courses (MOOCs)
Benzie & Harper, 2020	Use of Online Writing Labs (OWLs)	Online textbooks
Benzie & Harper, 2020; Pitura, 2022	Use of Digital Writing Portfolios	Studiosity and SmartThinking
Benzie & Harper, 2020; Koralage et al., 2023; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024	Computer-Assisted Language Learning	Grammarly Word processing software; Online platforms; Course management platform, Reference managers, Note taking software
Koralage et al., 2023	Synchronous and	Language forum

	Asynchronous Online Discussions	
(Martínez Lirola, 2022; Pitura, 2022	Use of Content Creation and Sharing	Blogging platforms

Among the nine studies analyzed, various teaching pedagogies that incorporated ICT in AEW were identified (see Table 4). Notably, online feedback (Benzie & Harper, 2020; Martínez Lirola, 2022; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024; Xue et al., 2023) emerged as the most prevalent pedagogical approach utilizing ICT tools in the AEW field. Collaborative writing (AlMarwani, 2020; Qub'a et al., 2024; Xue et al., 2023), blended learning (AlMarwani, 2020; Martínez Lirola, 2022; Pitura, 2022), the use of social media (Amirjalili et al., 2024; Koralage et al., 2023; Martínez Lirola, 2022; Pitura, 2022), the flipped classroom (Benzie & Harper, 2020; Koralage et al., 2023), and computer-assisted language learning (Benzie & Harper, 2020; Koralage et al., 2023; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024) are commonly employed in AEW classes. In addition, the pedagogies of writing analytics and feedback (Nazari et al., 2021) highlight the use of an automated writing system. Online writing labs (OWLs) (Benzie & Harper, 2020) provide access to various online textbooks, which offer substantial support to learners. Furthermore, digital writing portfolios (Benzie & Harper, 2020; Pitura, 2022) and synchronous and asynchronous online discussions (Koralage et al., 2023) are considered as other relevant teaching pedagogies. Blogging (Martínez Lirola, 2022; Pitura, 2022) emerged as the most prevalent method for learners to create and share their writing. The results mentioned emphasize the key trends in ICT integration for AEW, with online feedback being the most prevalent. The diverse ICT–integrated teaching pedagogies highlight the significance of ICT tools' impact on improving AEW instruction and student outcomes.

RQ2: What ICT tools are used to improve undergraduate students' writing performance in AEW classes?

Table 5: ICT tools used in academic English writing

Reference	Word Processing Software	Plagiarism Checkers	Online Writing Labs (OWLs)			Feedback Tools	Writing Analytics Tools	Learning Management Systems (LMS)	AI-Powered Writing Tutors		Multimedia tools
	Google Docs; Microsoft Word	Grammarly	MOOCs, such as Coursera, edX, and FutureLearn	Online textbooks such as Pearson's MyLab Writing or McGraw-Hill's ELLevate English	E-library	Language forum	AWE, AES, AWCF tool	Rain Classroom	Google Classroom	ChatGPT	Blogs, Facebook, Twitter, WhatsApp, Instagram; Yahoo, Google
AlMarwani, 2020									√		
Amirjalili et al., 2024										√	
Benzie & Harper, 2020		√	√	√							
Koralage et al., 2023			√			√					√
Martínez Lirola, 2022											√
Nazari et al., 2021		√					√				
Pitura, 2022	√	√			√						√
Qub'a et al., 2024		√									
Xue et al., 2023								√			

Table 5 provides the answer to the question what ICT tools are used to improve undergraduate students' writing performance in AEW classes, revealing that 44% of the analyzed studies showed the effectiveness of ICT tools such as Grammarly, which offers real-time grammar, spelling, and style suggestions, in teaching AEW. Following this, other ICT tools, including multimedia platforms, such as blogs, Facebook, Twitter, and Google, are particularly noted. The OWLs, especially in the form of MOOCs, account for 22% of the nine articles included. Additionally, LMS, such as Google Classroom and Rain Classroom platforms, occupy 11%, facilitating AEW instruction by enabling resource sharing, assignment submission, and interactive feedback. Word processing software, feedback tools, and AI-powered writing tutors are less prominently discussed in AEW field, as indicated by the number of research articles identified in Table 6. There is a trend that Grammarly is the most frequently used, while multimedia platforms and OWLs are also significant. LMS platforms and AI-powered tools, though less prominent, show growing potential.

Table 6: Number of research articles discussing ICT tools

ICT Tools	**Number of research articles**
Google Docs	1
Microsoft Word	1
Grammarly	4
MOOCs	2
Online textbooks	1
E-library	1
Language forum	1
Rain Classroom platform	1
Google Classroom	1
ChatGPT	1
Multimedia (Blogs, Facebook, Twitter, WhatsApp, Instagram; Yahoo, Google)	3

RQ3: What are the advantages of ICT-integrated teaching pedagogies in AEW classes?

Table 7: The benefits of teaching pedagogies using ICT in AEW

Reference	**Improve Cognitive Expression**		**Create Dynamic Learning Environment**							**Optimize Teaching Effectiveness**	
	Improve Writing Quality	Enhance Creativity and Critical Thinking	Improve Collaboration and Peer Learning	Promote Independent Learning	Assessment and Tracking	Writing Practice	Flexibility in Learning	Feedback	Access to Resources	Enhance Engagement, Motivation and Self-efficacy	Enhance Teacher Efficiency
AlMarwani, 2020		√		√							
Amirjalili et al., 2024	√										
Benzie & Harper, 2020											
Koralage et al., 2023	√		√			√			√	√	
Martínez Lirola, 2022	√	√	√				√	√		√	
Nazari et al., 2021			√		√	√		√		√	√
Pitura, 2022)	√		√			√		√	√		
Qub'a et al., 2024	√							√			
Xue et al., 2023			√				√	√			

The researchers delineated the advantages of utilizing ICT tools in the AEW field by categorizing them into three subsections, specifically: (1) Improving cognitive expression, (2) creating a dynamic learning environment, and (3) optimizing teaching effectiveness.

Improving Cognitive Expression

This section highlights how teaching pedagogies integrating ICT tools enhance cognitive expression competencies, as presented in Table 7. These competencies are categorized into two specific skills: (1) improved writing quality, and (2) enhanced creativity and critical thinking. The results indicate that improved writing quality represents a significant potential benefit associated with the use of ICT tools.

Creating a Dynamic Learning Environment

The researchers demonstrated how teaching pedagogies that incorporate ICT tools can foster a dynamic learning environment. These pedagogies are classified into seven distinct learning attributes: (1) improved collaboration and peer learning, (2) promotes independent learning, (3) assessment and tracking, (4) writing practice, (5) flexibility in learning, (6) feedback and (7) access to resources. The results of this classification have been detailed in Table 7.

Optimizing Teaching Effectiveness

In this section, the benefits of these teaching pedagogies are categorized into two main areas: (1) enhanced student engagement, motivation and self-efficacy, and (2) enhanced teacher efficiency. These benefits are significant for both students and teachers.

RQ4: What challenges arise in ICT-integrated teaching pedagogies for AEW?

Table 8: Challenges of using ICT tools in the AEW field

Challenges	References
Pedagogical Challenges	Martínez Lirola, 2022; Xue et al., 2023
Student Engagement	Martínez Lirola, 2022; Nazari et al., 2021; Xue et al., 2023
Interaction	Nazari et al., 2021; Xue et al., 2023
Lack of Digital Literacy	Amirjalili et al., 2024; Martínez Lirola, 2022; Nazari et al., 2021
Resistance to Change	Martínez Lirola, 2022; Xue et al., 2023
Ineffectiveness for Complex Writing Needs	AlMarwani, 2020; Amirjalili et al., 2024; Martínez Lirola, 2022; Qub'a et al., 2024

The answer to research question 4 outlines the challenges of using ICT tools in AEW class, as detailed in Table 8. They were classified into six challenges, namely (1) pedagogical challenges, (2) student engagement, (3) interaction, (4) lack of digital literacy, (5) resistance to change, and (6) ineffectiveness for complex writing needs.

5. Discussion

In this section, the researchers analyzed the research findings targeting the four research questions.

5.1 RQ1: What ICT-integrated teaching pedagogies enhance AEW skills at universities?

This SLR identified 11 types of teaching pedagogies that integrate ICT in AEW classes, with online feedback emerging as the most prevalent approach. The researchers posited that the significant contribution of AI-powered tools, such as Grammarly and ChatGPT, to effective instruction is to provide real-time and appropriate feedback to students, enhancing independent learning and self-editing skills (Benzie & Harper, 2020; Martínez Lirola, 2022; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024; Xue et al., 2023). Notably, mobile technologies can facilitate continuous formative assessment, enabling dynamic progress monitoring (Holstein et al., 2017; Reeves et al., 2017). However, while these tools excel in addressing surface-level errors, their effectiveness in fostering higher-order writing skills depends on teacher guidance, highlighting the need for a balanced approach.

Moreover, computer-assisted language learning is another widely used pedagogy, with tools, such as Grammarly and word processors, reducing errors and promoting autonomous learning (Benzie & Harper, 2020; Koralage et al., 2023; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024). Similarly, social media platforms, such as Facebook and blogs, foster collaboration and peer interaction, creating supportive learning communities (Amirjalili et al., 2024; Koralage et al., 2023; Martínez Lirola, 2022; Pitura, 2022). These tools bridge formal and informal learning, enhancing motivation and engagement. However, their success relies on structured tasks to ensure meaningful participation.

Blended learning and collaborative writing are also effective. Blended learning, facilitated by platforms such as Google Classroom, combines self-paced online activities with face-to-face instruction, promoting active learning (AlMarwani, 2020; Martínez Lirola, 2022; Pitura, 2022). Collaborative writing tools (AlMarwani, 2020; Pitura, 2022; Xue et al., 2023) such as Google Docs enable real-time co-authoring and peer feedback, fostering teamwork and communication. These methods demonstrate how ICT can enhance both individual and group learning experiences.

A flipped classroom model, supported by MOOCs such as Coursera, allows students to acquire foundational skills before class, enabling deeper in-person engagement (Benzie & Harper, 2020; Koralage et al., 2023). Similarly, digital writing portfolios and content creation and sharing encourage students to refine their work based on public feedback, fostering accountability and audience awareness (Benzie & Harper, 2020; Martínez Lirola, 2022; Pitura, 2022). These approaches highlight the potential of ICT to promote critical thinking and reflective learning.

However, there are some weaknesses in these ICT-integrated teaching pedagogies. For collaborative writing, strong digital literacy and access to reliable internet are required. It is necessary to plan carefully to balance online and offline components when adopting blended learning and flipped classroom. In terms of writing analytics and feedback, it overemphasizes surface-level errors and has limited ability to address higher-order writing skills. The phenomenon of over-reliance on automated feedback may reduce opportunities for teacher-student interaction when using online feedback. In addition,

clear guidelines are needed to ensure academic focus and meaningful participation when using social media. When using OWLs and the use of digital writing portfolios, it is challenging for students with limited digital skills and teacher guidance to ensure effective integration into the curriculum when using CALL.

Considering the strengths and weakness of different teaching pedagogies using ICT in AEW, the deeper understanding of practical implementation is provided. First of all, technology and pedagogy should be balanced. While ICT tools such as Grammarly and ChatGPT provide immediate feedback, their effectiveness is maximized when combined with teacher-led activities addressing higher-order skills. Second, structured implementation should be conducted. Tools such as social media and collaborative platforms require clear guidelines to ensure academic focus and meaningful participation. In addition, contextual adaptation should be made. The success of ICT integration depends on adapting tools to meet the diverse needs of students, including multilingual learners and those in resource-limited settings. This suggests a hybrid approach among ICT-integrated teaching pedagogies, which would address both surface-level and higher-order writing challenges, catering to diverse student needs in global English medium instruction contexts.

5.2 RQ2: What ICT tools are used to improve undergraduate students' writing performance in AEW classes?

The researchers explored nine articles concerning the use of ICT tools in the AEW field. The results, summarized in Table 5, revealed a range of ICT tools that align with specific pedagogical objectives. Notably, the results showed that Grammarly was the most commonly used ICT tool in AEW, appearing in four out of nine studies (Benzie & Harper, 2020l; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024). Grammarly supports independent learning by providing instant, detailed feedback on grammar, vocabulary, and sentence structure. Its ability to offer explanations and examples helps students refine their writing autonomously, fostering self-editing skills and improving clarity.

Multimedia tools such as blogs and Facebook (Koralage et al., 2023; Martínez Lirola, 2022; Pitura, 2022) promote collaboration and peer interaction. Blogs enable students to share their writing and receive emotional support through peer comments, creating a sense of community (Pitura, 2022). Similarly, Facebook offers numerous advantages for effective learning (Bowman & Akcaoglu, 2014; Daher, 2014; Martínez Lirola, 2022; Shraim, 2014), including the enhancement of student interest and motivation (Aubry, 2013; Shih, 2011), the promotion of positive relationships among students, as well as between teachers and students (Ellison et al., 2011; Mazer et al., 2007).

In terms of LMS (AlMarwani, 2020; Xue et al., 2023), the researcher employed Google Classroom to explore students' perceptions of Google Classroom and its impact on their academic writing, revealing an increasing awareness of the role digital tools play in fostering independent learning and critical thinking (AlMarwani, 2020). Additionally, tools such as Rain Classroom, used in electronic feedback (e-feedback) activities, encourage reflective learning by enabling students to engage with feedback iteratively (Xue et al., 2023).

Furthermore, MOOCs (Benzie & Harper, 2020; Koralage et al., 2023), including Coursera® and FutureLearn®, position writing as a more socially interactive practice, which allows students to discuss their writing contexts, practices, and challenges with peers globally. Other notable OWLs were also presented (Benzie & Harper, 2020). These platforms also offer flexible, self-paced learning opportunities, making academic writing accessible to a broader audience. Similarly, e-libraries provide students with access to high-quality empirical literature (Pitura, 2022), supporting research skills and evidence-based writing (Pitura, 2022).

Regarding AEW, commonly utilized word processing software includes Microsoft documents and Google documents (Pitura, 2022), which facilitate collaborative writing by enabling real-time editing and feedback from supervisors. These tools also support process-oriented writing, allowing students to revise their work iteratively (Pitura, 2022). These AI-powered writing analytics and Feedback Tools provide detailed, individualized feedback that aids students in recognizing their strengths and identifying areas for improvement. These tools, such as ChatGPT, also promote critical thinking by generating coherent text (Amirjalili et al., 2024) and providing alternative phrasing, encouraging students to evaluate and refine their writing (Amirjalili et al., 2024). Another type of interactive feedback function is the Language Forum, which offers example sentences and suggestions (Koralage et al., 2023).

The ICT tools vary in usability, effectiveness, and adaptability. Grammarly is highly usable and effective for grammar and vocabulary but less adaptable to higher-order writing skills. Multimedia tools like blogs and Facebook excel in fostering collaboration and peer interaction, though their effectiveness depends on student engagement. In addition, LMS tools (e.g., Google Classroom, Rain Classroom) support independent learning and iterative feedback, making them adaptable to diverse tasks. MOOCs offer flexible, self-paced learning but require student motivation. Some word processors like Google Docs enable real-time collaboration, while AI-powered tools like ChatGPT provide individualized feedback, promoting critical thinking. Each tool has unique strengths and limitations, and their combined use addresses various writing challenges.

5.3 RQ3: What are the advantages of ICT-integrated teaching pedagogies in AEW classes?

In this section, the researchers explore the advantages of employing ICT in teaching pedagogies for AEW from three perspectives, namely (1) improving cognitive expression, (2) creating a dynamic learning environment, and (3) optimizing teaching effectiveness.

5.3.1 Improving Cognitive Expression

In this section, the cognitive expression skills were acquired by various teaching pedagogies using ICT tools, which were classified into two skills, known as (1) Improving Writing Quality and (2) Enhancing Creativity and Critical Thinking, as illustrated in Table 7.

As depicted in Table 7, five out of nine studies examined the benefits associated with the improvement of writing quality, also referred to as writing competency enhancement (Amirjalili et al., 2024; Koralage et al., 2023; Martínez Lirola, 2022; Pitura, 2022; Qub'a et

al., 2024). Two articles indicated that creativity and critical thinking can also be fostered (AlMarwani, 2020; Martínez Lirola, 2022). A study conducted by (Martínez Lirola, 2022) showed that these technologies can facilitate knowledge creation and the development of new competencies, ultimately leading to improved writing outcomes. Additionally, another study emphasized the role of Facebook in enhancing students' writing abilities in the English language (Martínez Lirola, 2022). Meanwhile, Amirjalili et al. (2024) illustrated that ChatGPT can generate coherent text. Plagiarism Checkers- Grammarly can assess English articles, especially for grammatical errors and punctuation mistakes (Qub'a et al., 2024). Furthermore, it is remarkable to note that CALL literature shows that digital tools can help bi/multilingual students produce texts with fewer errors (Koralage et al., 2023). Last but not least, two studies focusing on the improvement of creativity and critical thinking were identified. AlMarwani (2020) gave evidence that digital tools foster critical awareness, while Martínez Lirola (2022) showed that such tools can aid in the development of higher-order thinking skills among students.

5.3.2 Creating a Dynamic Learning Environment

In this part, the researchers argued the creative dynamic learning environment formed through teaching pedagogies combined ICT in the AEW field, namely (1) improving collaboration and peer learning, (2) promoting independent learning, (3) assessment and tracking, (4) writing practice, (5) flexibility in learning, (5) feedback, and (6) access to resources.

Firstly, among studies exploring the use of ICT tools in AEW teaching, five of the nine articles reviewed highlighted collaboration and peer learning. Numerous researchers have asserted that cooperation is crucial to improving academic writing skills (Koralage et al., 2023; Martínez Lirola, 2022; Nazari et al., 2021; Pitura, 2022; Xue et al., 2023). Martínez Lirola (2022) asserted that students actively engage in content generation and knowledge sharing through interaction, fostering participation, cooperation, and continuous learning. This aligns with findings that students prefer collaborative learning experiences (Nazari et al., 2021). Additionally, studies highlight that new technologies, such as audio and video feedback tools, significantly enhance peer feedback and improve learning outcomes (Cunningham, 2019; Killingback et al., 2019; Koralage et al., 2023). Furthermore, online learning and discussion platforms facilitate interactive discussions and provide opportunities for writing feedback (Chong, 2019; Kobayashi et al., 2017; Pitura, 2022; Sarré et al., 2021).

Flexibility in learning is a key advantage of these pedagogical approaches (Martínez Lirola, 2022; Xue et al., 2023). ICT tools enable interactions unrestricted by time and space, fostering autonomous learning (Martínez Lirola, 2022). This aligns with findings that the widespread use of smartphones enhances e-feedback due to their inherent flexibility (Xue et al., 2023). Furthermore, AEW classes offer diverse resource access methods. As noted by (Koralage et al., 2023), search engines like Google provide extensive information repositories that significantly improve students' writing skills. Additionally, university electronic libraries (e-libraries) are frequently utilized as primary sources of high-quality, freely accessible literature (Pitura, 2022).

Another significant benefit of ICT-based teaching pedagogies is the provision of timely and appropriate feedback (Martínez Lirola, 2022; Nazari et al., 2021; Pitura, 2022; Qub'a et al., 2024; Xue et al., 2023). For instance, tools such as Grammarly, provide accurate and reliable feedback on various aspects of writing, such as correctness and clarity, along with revision suggestions (Nazari et al., 2021; Qub'a et al., 2024). Similarly, platforms like Facebook enable students to receive immediate feedback and address errors during the writing process (Martínez Lirola, 2022). Technology integration is particularly beneficial for L2 writers, as it supports access to formative and summative feedback (Pitura, 2022; Strobl et al., 2019) and offers real-time insights into learning progress (Nazari et al., 2021). Additionally, a range of new technologies now exists that facilitate audio, and video feedback (Xue et al., 2023).

Increased writing practice as a key benefit of ICT-based teaching pedagogies was highlighted by three of the reviewed articles (Koralage et al., 2023; Nazari et al., 2021; Pitura, 2022). Artificial intelligence (AI) applications, for instance, provide comprehensive instructional practices (Nazari et al., 2021), while the integration of specific digital tools, coupled with training on their effective use, maximizes their potential. Tools such as Google Docs, Microsoft Word, and blogging platforms can significantly enhance students' writing practices (Pitura, 2022). Additionally, technology enables teachers to reduce their workload through student self-assessment and facilitates immediate formative and summative assessments, such as those enabled by mobile technologies (Nazari et al., 2021). Finally, as emphasized by (AlMarwani, 2020), digital tools foster independent learning among students.

5.3.3 Optimizing Teaching Effectiveness

Concerning optimizing teaching effectiveness, three reviewed articles emphasized the role of ICT tools in enhancing engagement, motivation, and self-efficacy (Koralage et al., 2023; Martínez Lirola, 2022; Nazari et al., 2021). Research by Nazari et al. (2021) highlighted that AI fosters student engagement, motivation, and self-regulation, while also improving self-efficacy and academic emotions among L2 learners, promoting writing autonomy and reducing test anxiety. Similarly, a study by Martínez Lirola (2022) found that Facebook increases student motivation and engagement in English language learning. Additionally, online translators have been shown to enhance motivation in L2 text production (Koralage et al., 2023). Moreover, ICT tools improve teacher efficiency by enabling flexible teaching, facilitating ongoing formative assessment, and reducing workload through student self-assessment (Nazari et al., 2021).

5.4 RQ4: What challenges arise in ICT-integrated teaching pedagogies for AEW?

Table 8 outlines the challenges of using ICT tools in AEW, categorized into six areas: (1) pedagogical challenges, (2) student engagement, (3) interaction, (4) lack of digital literacy, (5) resistance to change, and (6) ineffectiveness for complex writing needs. These challenges can be further grouped into three overarching themes: technical issues, pedagogical challenges, and user-related concerns.

5.4.1 Technical Issues

As illustrated in Table 8, four studies highlighted the limitations of ICT tools in addressing complex writing needs (AlMarwani, 2020; Amirjalili et al., 2024; Martínez

Lirola, 2022; Qub'a et al., 2024). AlMarwani (2020) argued that technology alone cannot ensure improved writing outcomes, particularly for postgraduate students, underscoring the necessity of human intervention. Similarly, Qub'a et al. (2024) observed that tools like Grammarly often fail to resolve higher-order issues such as argument coherence and logical fallacies, making their assessment scores unreliable for AEW. Additionally, generative pre-training transformer (GPT) models have been criticized for their inability to accurately reference literary texts and their tendency to generate overly simplistic writing styles (Amirjalili et al., 2024). Martínez Lirola (2022) further emphasized the challenges of evaluating academic performance using platforms like Facebook, as they are not designed for educational purposes.

5.4.2 Pedagogical Challenges

There are some difficulties teachers face in integrating ICT tools into their teaching practices and in understanding the impact of these tools on learning outcomes. When adapting to ICT tools, teachers often struggle to adapt platforms like Facebook for educational purposes, as they must first familiarize themselves with the platform's functionalities (Martínez Lirola, 2022). This highlights the need for training and support to help educators effectively leverage ICT tools in their teaching. Additionally, with respect to e-feedback, it is essential for teachers to clearly convey both the learning objectives and the evaluation criteria in e-feedback activities. Failure to do so may pose significant challenges for students (Xue et al., 2023). While ICT tools can assist with surface-level writing tasks, they cannot replace the nuanced guidance provided by human instructors. AlMarwani (2020) emphasized the importance of scaffolded feedback from lecturers to address complex writing needs.

5.4.3 User-Related Concerns

User-related challenges encompass issues stemming from the attitudes, skills, and behaviors of both teachers and learners. A number studies emphasized the lack of digital literacy experienced by both teachers and learners (Amirjalili et al., 2024; Martínez Lirola, 2022; Nazari et al., 2021). For example, Martínez Lirola (2022) noted that teachers must familiarize themselves with platforms like Facebook to integrate them into teaching activities. Similarly, Wosnitza and Volet (2005) highlighted that deficiencies in digital literacy can lead to anxiety and disengagement among students (Nazari et al., 2021). In addition, students are expected to develop a degree of technological literacy that includes an understanding of the strengths and limitations of AI-generated text (Amirjalili et al., 2024).

Resistance to change is a significant challenge in ICT-integrated AEW teaching environments. Miller (2020) noted that teachers must exert additional effort to monitor language use online, while Martínez Lirola (2022) found that some students are hesitant to engage in online writing activities. This resistance is often compounded by feelings of frustration or information overload, particularly when students are inundated with excessive content (Xue et al., 2023). Studies report lower engagement levels in online AEW settings consistently (Martínez Lirola, 2022; Nazari et al., 2021; Xue et al., 2023), compared to face-to-face environments (Skinner et al., 2014), attributing this to limited social interaction, platform distractions (e.g., Facebook notifications), and difficulties maintaining focus. Furthermore, insufficient digital literacy can heighten feelings of

boredom and anxiety, further diminishing engagement (Nazari et al., 2021). Lastly, online environments may amplify negative emotions, such as frustration and anxiety, especially when students struggle to adapt to new technologies or platforms (Martínez Lirola, 2022; Xue et al., 2023).

The challenges reveal the complexity of integrating ICT tools into AEW. Technical limitations highlight the necessity for more advanced tools to address complex writing needs. Pedagogical challenges underscore the importance of teacher training and clear guidelines for effective ICT use. Meanwhile, user-related concerns call for strategies to improve digital literacy, reduce resistance to change, and enhance student engagement. Addressing these challenges can enable educators and researchers to optimize the integration of ICT tools in AEW, ultimately improving teaching and learning outcomes.

6. Conclusion

This SLR explored studies on ICT-based teaching pedagogies in AEW. Following PRISMA 2020 guidelines, nine articles were identified from three databases, and four research questions were addressed to achieve the review's objectives. The implications, limitations, and suggestions for future research are discussed in the subsequent sections.

6.1 Implications

By systematically reviewing literature from diverse articles within the recent five years, this study provides a comprehensive synthesis of how ICT is being utilized in AEW instruction globally. Policymakers should invest in ICT infrastructure and advocate for the integration of ICT tools in university curricula to enhance the teaching of AEW. This includes the adoption of digital platforms, online resources, and interactive software to facilitate engaging learning experiences. In addition, institutions should invest in continuous professional development programs to equip teachers with the necessary skills to effectively use ICT in teaching.

6.2 Limitations

However, this study does have some limitations. First, this SLR only adopts the database of WoS, ERIC and Scopus, utilizing a limited data selection. Second, this review predominantly emphasizes the benefits of employing ICT tools in AEW field, with a particular focus on teachers and students. While the paper references previous studies, it does not compare their findings to identify similarities or differences.

6.3 Future Research Suggestions

Adding other databases, such as Google Scholar, ScienceDirect, and SpringerLink, in future research could broaden the scope of the research and provide further support for conducting a SLR of AEW. Furthermore, future research could yield valuable insights by incorporating the perspectives of software developers within the AEW domain. Addressing the barriers through targeted training and institutional support is crucial for maximizing the impact of ICT in AEW teaching. Last, but not least, solving sample size, scope, or publication bias would strengthen the credibility of this study.

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