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Digital Tools and Writing Proficiency: A Comprehensive Review of Research

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ABSTRACT: *With the rapid growth of Artificial Intelligence and digitalization, it is crucial to raise the bar for writing standards. In today's world, it is essential to take advantage of technology to improve the learning process and enhance individuals' writing skills. Despite arguments from technology advocates about the benefits of Information and Communication Technology (ICT) tools in supporting students' writing practices, there is a lack of solid empirical evidence to back up this claim, thus leading to a limited understanding of the effects of digitalization. This review of research focused on twenty empirical studies conducted between 2016 and 2024, which investigated the use of ICTs in writing education. This paper shed light on how technology was integrated into writing practices, its impact on students' writing abilities, and the challenges faced by educators and students when incorporating technology into the writing curriculum. Results of the review demonstrated that the insertion of technology into EFL writing classrooms has shown significant promise in improving students' writing skills, critical thinking, and overall engagement. Research indicates the effectiveness of blended teaching methods that merge traditional approaches with technological resources.*

KEYWORDS: digital tools, ICT, instruction, technology, writing

الملخص: مع النمو السريع للذكاء الاصطناعي والتحول الرقمي، من الضروري رفع مستوى معايير الكتابة. في الوقت الحالي، من الضروري الاستفادة من التكنولوجيا لتحسين عملية التعلم وتعزيز مهارات الكتابة لدى الأفراد. على الرغم من حجج المدافعين عن التكنولوجيا حول فوائد أدوات تكنولوجيا المعلومات والاتصالات (ICT) في دعم ممارسات الكتابة لدى الطلاب، إلا أن هناك نقصًا في الأدلة التجريبية القوية لدعم هذا الادعاء، مما يؤدي

إلى فهم محدود لتأثيرات الرقمنة. ركزت هذه المراجعة للأبحاث على عشرين دراسة تجريبية أجريت بين عامي 2016 و2024، والتي بحثت في استخدام تكنولوجيا المعلومات والاتصالات في تعليم الكتابة. تلقي هذه الورقة الضوء على كيفية دمج التكنولوجيا في ممارسات الكتابة، وتأثيرها على قدرات الطلاب في الكتابة، والتحديات التي يواجهها المعلمون والطلاب عند دمج التكنولوجيا في منهج الكتابة. أظهرت نتائج المراجعة أن إدخال التكنولوجيا في فصول الكتابة باللغة الإنجليزية كلغة أجنبية قد أظهر وعدًا كبيرًا في تحسين مهارات الكتابة لدى الطلاب والتفكير النقدي والمشاركة الشاملة. تشير الأبحاث إلى فعالية طرق التدريس المدمجة التي تدمج الأساليب التقليدية مع الموارد التكنولوجية.

الكلمات المفتاحية: الأدوات الرقمية، التعليم، التكنولوجيا، الكتابة، تكنولوجيا المعلومات والاتصالات.

Introduction

Post-COVID-19, various courses are being delivered online, in a blended format, or through a flipped approach. Even traditional face-to-face courses now incorporate technology in their content delivery. This shift has highlighted the growing necessity of integrating technology into all aspects of the learning process, especially in writing. Writing skills are fundamental for literacy and are essential for academic success, employment opportunities, and career advancement (Graham & Perin, 2007). With the rapid advancements and availability of Information and Communication Technologies (ICTs), it is imperative to re-evaluate the definition of "writing" and the methods of writing instruction (Williams & Beam, 2019).

Across various educational levels, writing has emerged as a significant area of focus, playing a crucial role in teaching and learning across different subjects (Strobl, et al., 2019). In Algerian middle and secondary schools, writing still predominantly follows traditional methods involving pen and paper, alongside printed texts. However, educators and students must adapt by incorporating digital tools into the writing curriculum. Similarly, higher education institutions are increasingly embracing innovative technology in academic writing to enhance learning, research, and education (Iqbal, Rahaman, Debi, & Arefin, 2021).

As noted by Ferdousi (2022), the inclusion of digital tools and applications in classroom writing activities can support students, who may find it more engaging to write using such resources. By integrating digital technology, educators can offer diverse opportunities and strategies to enhance students' proficiency in professional and academic writing. It is crucial to demonstrate

to students that writing can be an enjoyable learning experience by equipping them with appropriate tools and strategies for effective writing (Sandolo, 2010).

Teacher trainers and researchers in education play a significant role in shaping teaching practices and conducting research. Therefore, it is essential for them to stay updated on how digital technology is utilized in writing programs, understand the impact of technology on students' writing skills, and be aware of the challenges teachers may encounter when implementing technology-based writing instruction (Williams & Beam, 2019).

This review aims at enhancing students' writing skills, particularly through computer technology programs. The research concentrates on the effectiveness of integrating advanced digital technology to improve students' academic writing abilities. To achieve this goal, the study sought to explore the integration of technology in writing tasks, its influence on students' writing skills, and the obstacles encountered by educators and students in incorporating technology into the writing curriculum.

This study aims to answer the following research questions

1.How is technology integrated into writing practices?

2.How does technology impact students' writing skills?

3.What are the challenges faced by teachers and students in incorporating technology in the writing curriculum?

Literature Review

Technology has a vital role in enhancing writing abilities. For example, using word processors and writing software enables students to edit and revise their work to a better writing quality. Additionally, technology allows for immediate feedback, which is crucial for writing progress (Grimes & Warschauer, 2010). Collaborative writing tools like Google Docs have been shown to significantly boost writing proficiency by encouraging peer collaboration and feedback. Kessler, Bikowski, & Boggs (2012) indicated that students participating in collaborative writing tasks exhibit enhanced writing skills and greater motivation. These tools promote real-time collaboration, enabling learners to exchange ideas and provide feedback, creating a more interactive and supportive writing environment.

Digital platforms such as blogs and wikis provide unique opportunities for students to practice writing in real-world contexts. Sun & Chang (2012) have shown that blogging assists students in honing their writing skills by offering a genuine audience and purpose for their writing. Lee (2010) reported that wikis enhance writing proficiency by encouraging collaborative content creation and peer editing.

The rise of mobile devices has resulted in the creation of various writing apps that support writing instruction. For instance, apps such as My Writing Spot and Writer's Digest offer tools for brainstorming, organization of ideas, and drafting essays. According to Lu in 2008, mobile learning can boost writing proficiency by offering learners convenient and flexible access to writing practice and resources.

The researcher Ferdousi 2022 organised multiple beneficial web tools and applications in writing-intensive courses to enhance students' academic and technical writing abilities in tables. The writing applications specified in his study are available for free or may require minimal fees.

Minimum Fee or Free Basic Plan	**Free**
Writing Apps	
Scrivener	Grammarly
Ulysses	Reedsy Book Editor
Reedsy Book Editor	Natural Reader
IA Writer	FocusWriter
Storyist	Reedsy Prompts
Final Draft	yWriter
ProWriting Aid	Novelist
Hemingway	Markor
Readable	Character Story Planner 2
Freedom	
Evernote	
Writing Apps for Android Operating Systems	
Character Story Planner 2	Microsoft Word, OneDrive, OneNote
Google Docs, Drive, Keep Notes	Novelist
Grammarly Keyboard	Pure Writer

Jotter Pad	Writer Plus
Markor	Writer Tools
Writing Apps for Designers and Writers	
Quip: Cross-plateform writing and collaboration app	
Hemingway editor: Ultimate editing tool	
Grammarly: writing and editing tool	
Draft: minimal markdown editor	
Airstory: Research, outline and write in one place	

Table 1. Available tools and apps to enhance students' writing skills

Although technology brings many advantages to writing instruction, it also presents challenges. Varying access to technology and digital literacy skills among students can widen educational inequalities. Furthermore, the effectiveness of technology in writing instruction relies on how it is integrated into the curriculum and supported by teachers (Higgins, Xiao, & Katsipataki, 2012). Halsey 2007 reported that technology might not be the best solution for all students, but states that when students know there is a purpose behind their writing, publishing their work on the internet, their motivation tends to increase because now they know that there is a real audience who will be reading their work.

Methodology

In this research, the researcher adopted the comprehensive review method to examine recent studies using technology to enhance students' writing skills. Cooper (1998) said that research reviews offer a thorough integration of various studies, providing a better insight into the present level of knowledge on a specific subject.

The methodology employed for conducting this review involved searching databases and scholarly, peer-reviewed journals. Initially, we searched databases such as Google Scholar, ResearchGate, Sci-Hub, and SNDL that gave access to journals like JSTOR, Science Direct, and Springer Open. The database search terms included: Use of technology in writing + digitalisation

and writing skills+ writing and technology. To focus our search, we set the following delimitations:

•Analysis of articles with empirical work containing first-hand data.

•Publication of articles between 2016 and 2024, and

•Written in English.

Regarding the exclusion criteria, studies that consisted solely of reviews or conference proceedings were published in languages other than English or conducted before 2016.

During the screening process, peer reviewers selected articles based on their titles and abstracts, eliminated those conducted on students, not teachers, articles containing explorations through book analysis or literature reviews. They kept studies with data from experiments, surveys, or interviews. Furthermore, they read all articles thoroughly to remove replicated studies with identical findings. To enhance the validity of our search, researchers included only articles from peer-reviewed and scholarly journals. The database search originally included 100 articles, but after reviewing titles and abstracts, 20 relevant articles were retained.

The researcher extracted only information from each article in the data extraction process, mainly bibliographic information, such as title, authors, year of publication, and journals. In addition, researchers focus on extracting research questions, objectives, design, methods, variables, data collection tools, operational definitions, key trends, findings, statistical or thematic outcomes, interpretations, implications, limitations, gaps, and the study's contribution to the field.

Results and Discussion

Technology transforms the traditional approach to teaching writing, allowing for more interactive and collaborative learning opportunities. Electronic writing courses enhance student involvement and offer various channels for receiving feedback and making revisions. Nonetheless, they also reveal issues like unequal access to technology and differing levels of digital literacy among students, which may impede the effectiveness of electronic writing education (Hawisher & Selfe, 1991). Technology, including word processors, speech-to-text tools, and interactive writing

software, is crucial for students' writing skills and engagement. These tools are for the quality, length, and organization of written work after intervention. Moreover, technology might decrease negative behaviours and increase students' focus on tasks (Heintzelman, 2016). This section will review past studies to address the research inquiries

How is Technology Implemented in EFL Writing Classrooms?

The utilization of technology in EFL writing classrooms manifests in various innovative ways. These approaches encompass utilizing weblogs, engaging in digital multimodal composing tasks, and employing digital tutors, each playing a distinct role in enhancing students' writing abilities.

Weblogs for Reflective and Creative Thinking

Iman (2020) delved into weblogs as an additional tool in EFL writing classrooms. Through quantitative and qualitative methodologies, her research involved administering surveys to 20 master's students and conducting interviews with six educators. The results indicated that weblogs effectively stimulate reflective and imaginative thinking among students. Weblogs enable students to share their writing online, creating a space for feedback from peers and teachers. This interactive setting motivates students to delve deeper into their writing, cultivating a sense of ownership and satisfaction in their work. The study accentuates that weblogs also aid students in cultivating a more individualized and genuine voice that enhances their overall writing proficiency.

Collaborative Digital Multimodal Composing (DMC) Tasks

Kim, Kang, Nam, and Skalicky (2022) explored the influence of collaborative digital multimodal composing (DMC) tasks on the writing skills of EFL learners. Utilizing a mixed-methods approach with 116 Korean high school students. The study evaluated both structured and unstructured planning in DMC tasks. These tasks incorporated digital resources to facilitate multimodal literacy and active peer collaboration.

The study demonstrated that DMC tasks improve students' capability to articulate thoughts through multiple mediums, such as text, images, and audio, thereby enriching their writing experiences. The collaborative aspect of these tasks encourages peer interaction and feedback, further enhancing the educational process. The research emphasizes the significance of

providing structured support to maximize the advantages of DMC tasks, ensuring that all students can actively participate and contribute.

Digital Tutors for Gamified and Personalized Learning

Kalsoom et al. (2024) adopted a survey-based strategy involving 359 participants to assess the effectiveness of digital tutors like Duolingo and Babbel. The survey evaluated the perceived usefulness, user-friendliness, and frequency of engagement, underscoring the efficacy of these platforms, enhancing reading and writing through gamification and personalized learning pathways. Digital tutors offer interactive exercises that adjust to the learner's skill level, providing instant feedback and incentives to encourage continuous practice.

The gamified components, such as earning points and completing levels, render learning more captivating and enjoyable. The study indicates that these platforms are especially effective in encouraging consistent practice and sustained participation as essential clues in language acquisition. Moreover, the personalized learning pathways enable students to advance at their own pace, catering to individual learning requirements and preferences.

Discussion of Literature: The Impact of Technology on Students' Writing Skills

In their study, Wang, Li, Lu, and Chen (2024) utilized a mixed-methods design, combining qualitative and quantitative methods to assess the effectiveness of blended teaching strategies in TESOL. Their study included pre-and post-tests, surveys, and interviews to evaluate writing proficiency, student engagement, and critical thinking skills. The outcomes demonstrate that integrating traditional and technological approaches boost students' writing abilities, critical thinking, and engagement, offering a comprehensive and interactive learning environment.

Mirza (2019) took an exploratory, qualitative stance through descriptive and analytical techniques. This research enlisted 20 second-year student-teachers in digital storytelling (DST) tasks as part of an EFL communication course. These tasks entail creating and examining digital stories for enhancements in various skills. The results indicate that DST, not only improves writing skills, but also pronunciation, organization, technical, and presentation skills. The qualitative nature of the study enables a thorough exploration of students'

experiences and skill progress, emphasizing the wide-ranging benefits of DST in EFL education.

Moreover, Rogne et al. (2024) opted for a quantitative approach to compare the impacts of digital writing tools and traditional handwriting instruction on first-grade students. The study divides students into experimental and control groups, with the former using digital writing tools and the latter receiving traditional handwriting guidance. Researchers assess text length, spelling accuracy, and handwriting legibility. The findings reveal that digital writing tools help students generate longer texts with improved spelling accuracy, while traditional handwriting instruction excels in legibility. This research highlights the specific advantages of digital tools in enhancing writing while recognizing the enduring significance of ancient methods.

Challenges Faced by Teachers and Learners in Integrating Technology in the EFL Curriculum

Despite the advantages of adopting technology in the EFL curriculum, many obstacles arise, as indicated in the examined research. Curado (2023) undertook a detailed case study concentrating on rural schools to pinpoint the specific hurdles to technology integration. The investigation includes teacher and administrator interviews, classroom observations, and surveys. Results show that inconsistent technology access poses a significant challenge, often due to limited infrastructure and financial constraints in non-urban areas.

Moreover, the study underscores a substantial requirement for continuous teacher training to employ technological tools in the classroom. Teachers express worries about incorporating new technologies without sufficient professional development, highlighting a gap between technological availability and practical usage.

Kalsoom et al. (2024) utilized a survey-based research approach with 359 participants to evaluate the usage of digital tutors such as Duolingo and Babbel. The study uncovers several obstacles, including potential biases in self-reported data, which may distort the perceived efficiency of these tools. The authors focus on the importance of longitudinal studies in evaluating the long-term effects and their sustainability in EFL education. They also mention that while digital tutors offer benefits, their effectiveness might be

constrained to students' varying levels of technological competence and access to reliable internet connectivity.

Furthermore, Kim et al. (2022) pointed out challenges in managing technological skills and ensuring fair participation during collaborative digital multimodal composing (DMC) activities. Their mixed-methods approach, incorporating quantitative data from writing assessments and qualitative insights from peer interaction observations, offers a comprehensive insight into these obstacles. The study discovers that students often encounter constraints navigating the technological elements of multimodal projects, resulting in unequal participation and collaboration. Teachers also note hurdles in guiding and overseeing these activities, necessitating a balance between supporting students and enabling independent exploration.

Implications for Practice and Policies

Using technology in EFL writing classes brings valuable advantages, including improved writing skills, critical thinking, and student involvement. Nevertheless, addressing practical and policy implications is crucial to harness these benefits. Schools in rural areas prioritize enhancing technological infrastructure and ensuring consistent access to digital resources. Policymakers should dedicate resources to continuous professional development programs for teachers to effectively incorporate technology. Moreover, educational institutions should adopt a balanced approach by combining traditional and digital teaching methods to meet diverse learning needs and ensure equal participation in digital activities, essential for students' varying technological skills and access, which may require targeted support and interventions.

Recommendations for Future Research

Future research endeavours should concentrate on longitudinal studies to evaluate the prolonged effects of technology integration in the EFL curriculum. Such studies would offer deeper insights into the sustainability and efficacy of digital tools over time. Additionally, researchers should delve into the specific obstacles encountered by distinct demographic groups, such as rural and urban students, to devise customized strategies for technology integration. Further exploration is warranted into the efficiency of different digital tools and platforms, assessing their impact on various

aspects of writing skills. Utilizing mixed-methods approaches that combine quantitative and qualitative data would yield a comprehensive understanding of the diverse effects of technology on EFL education. Lastly, studies should investigate the influence of teacher training programs on enhancing the proficient utilization of technology in classrooms, pinpointing best practices and areas for enhancement.

Conclusion

Using technology in EFL writing classrooms has shown significant promise in improving students' writing skills, critical thinking, and overall engagement. Research indicates the effectiveness of blended teaching methods that merge traditional approaches with technological resources. Wang et al. (2024) demonstrated that a combination of strategies notably enhances writing proficiency and critical thinking skills. Digital storytelling, as emphasized by Mirza (2019), boosts various skills essential for effective communication.

Furthermore, Rogne et al. (2024) illustrated that digital writing tools assist students in creating longer and more accurate texts, highlighting the advantages over conventional techniques. Despite these advancements, challenges persist in effectively integrating technology into EFL curricula. Concerns such as uneven technology access and the necessity for teacher training, particularly in rural areas, are crucial issues (Curado, 2023). Kalsoom et al. (2024) warn against biases in self-reported data and emphasize the importance of longitudinal research to evaluate long-term impacts. Moreover, managing technological skills and ensuring fair participation in collaborative tasks remain obstacles (Kim, Kang, Nam, & Skalicky, 2022).

Overcoming these challenges necessitates practical and policy-driven approaches. Schools prioritize enhancing technological infrastructure and ensuring fair access to digital resources, especially in underserved regions. Policymakers must allocate resources for continuous teacher training programs to improve technological integration skills. Embracing a balanced pedagogical approach that merges traditional methods with digital resources can cater to diverse learning needs and enhance educational quality.

Future studies should concentrate on longitudinal research to assess sustained impacts and the effectiveness of digital tools over time. Identifying

specific challenges encountered by different demographic groups will aid in creating tailored strategies for technology integration. Further exploration into the effectiveness of various digital tools and platforms is essential to guide best practices in EFL education. Utilizing mixed-methods approaches that combine quantitative and qualitative data will offer comprehensive insights into the multifaceted impacts of technology.

In conclusion, although challenges in integrating technology into EFL education persist, strategic enhancements in infrastructure, teacher training, and pedagogical methods can maximize its advantages. Future researchers and policy initiatives should strive to establish sustainable strategies that ensure fair access and long-term success of technology integration in enhancing writing skills and critical thinking. By doing so, we can cultivate a more inclusive and efficient learning environment that readies all students for the demands of the digital era

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