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AI WRITING TOOLS IN THE CLASSROOM: INVESTIGATING USAGE, CHALLENGES, AND ADAPTATIONS BY RURAL ENGLISH TEACHERS

by

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Abstract.

This phenomenological study explores the integration of AI tools in teaching English writing in rural Central Aceh, offering insights into the educators' challenges and adaptive strategies. Amidst the global push towards digital education, rural areas often lag behind due to infrastructural deficits and limited access to advanced technological resources. This study aims to understand how AI tools are being utilized by teachers in such contexts to improve English writing skills. Conducted through semi-structured interviews with three high school teachers, the study employs a thematic analysis to uncover how educators navigate the complexities of using AI tools like ChatGPT, Grammarly, and Quillbot under constrained conditions. Key challenges identified include limited technological infrastructure, absence of formal training, and diverse student proficiency with technology. Despite these challenges, teachers have adopted innovative strategies such as shared computer time, collaborative learning, self-learning initiatives, and leveraging community support networks. The findings highlight the resilience and adaptability of educators in underserved regions, suggesting that enhancing technological infrastructure, providing targeted professional development, and developing user-friendly AI tools are crucial for bridging the educational divide. The study calls for a balanced approach to integrating AI in education, ensuring that it complements traditional teaching methods and fosters inclusive learning environments.

Keywords: AI writing tools, English writing, rural education, phenomenological study, teacher adaptation

Abstrak.

Penelitian fenomenologis ini mengeksplorasi integrasi alat AI dalam pengajaran menulis bahasa Inggris di Aceh Tengah, yang menawarkan wawasan tentang tantangan dan strategi adaptif pendidik. Di tengah dorongan global menuju pendidikan digital, daerah pedesaan sering tertinggal karena defisit infrastruktur dan akses terbatas ke sumber daya teknologi canggih. Studi ini bertujuan untuk memahami bagaimana alat AI digunakan oleh guru dalam konteks tersebut untuk meningkatkan keterampilan menulis bahasa Inggris. Pengumpulan data dilakukan melalui wawancara semi-terstruktur dengan tiga guru SMA. Studi ini menggunakan analisis tematik untuk mengungkap bagaimana para guru menavigasi kompleksitas penggunaan alat AI seperti

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ChatGPT, Grammarly, dan Quillbot dalam kondisi terbatas. Hasil temuan menyatakan bahwa terdapat tantangan utama yang diidentifikasi meliputi infrastruktur teknologi yang terbatas, ketiadaan pelatihan formal, dan keberagaman kemahiran siswa dengan teknologi. Terlepas dari tantangan tersebut, guru telah mengadopsi strategi inovatif seperti waktu komputer bersama, pembelajaran kolaboratif, inisiatif belajar mandiri, dan memanfaatkan jaringan dukungan komunitas. Temuan tersebut menyoroti ketahanan dan kemampuan adaptasi pendidik di daerah kurang melayani, menunjukkan bahwa meningkatkan infrastruktur teknologi, menyediakan pengembangan profesional yang ditargetkan, dan mengembangkan alat AI yang ramah pengguna sangat penting untuk menjembatani kesenjangan pendidikan. Studi ini menyerukan pendekatan seimbang dalam integrasi AI dalam pendidikan, memastikan bahwa itu melengkapi metode pengajaran tradisional dan mendorong lingkungan belajar yang inklusif.

***Kata kunci**: Alat AI dalam pengajaran menulis, menulis Bahasa Inggris, pendidikan daerah tertinggal, studi fenomenologis, adaptasi guru*

INTRODUCTION

English language proficiency stands as an indispensable asset in navigating the interconnected global landscape of the 21st century. However, a stark contrast persists between the educational opportunities available in urban and rural areas, with students in remote regions often facing significant barriers to accessing quality English education (Muchsin et al., 2022; Poedjiastutie et al., 2021). This educational disparity underscores the urgent need to enhance English language instruction in underserved rural regions, with Central Aceh serving as a poignant example.

Simultaneously, the burgeoning field of Artificial Intelligence (AI) in education offers a promising avenue for transforming learning experiences and addressing educational inequalities. The integration of AI technologies into English language instruction holds immense potential for optimizing teaching methodologies and enhancing student outcomes (Hapsari & Wu, 2022; Park, 2019; Qi et al., 2022; Sumakul et al., 2022; Toncic, 2020). However, despite the proliferation of AI applications across various educational domains, including language learning, scant attention has been directed towards its specific application in teaching English writing, particularly within rural contexts.

The integration of AI in educational settings has predominantly been studied within urban and well-resourced environments, leaving a significant gap in understanding its impact in rural areas. This gap is especially pronounced in places like Central Aceh, where educational technology often lags due to various systemic and infrastructural challenges. The dearth of research focusing on the implementation of AI in teaching English writing in rural areas underscores a critical gap in educational scholarship. This gap is further compounded by

the unique resource constraints prevalent in such regions, where shortages of qualified English teachers are commonplace.

Central Aceh represents a critical case study due to its unique challenges and the potential transformative impact of AI tools. The region is characterized by limited access to educational resources, intermittent internet connectivity, and a general lack of modern teaching aids that are often taken for granted in more urbanized areas. These conditions present a unique opportunity to explore not only the feasibility but also the effectiveness of AI tools in enhancing educational outcomes under significant constraints. The region offers only a fraction of schools equipped with necessary technology to support modern educational practices (Syahrin & Bin As, 2021), illustrating a dire need for innovative solutions like AI, particularly both for teachers and pupils (Jaya et al., 2021).

Ascertaining the feasibility and effectiveness of integrating AI into English writing instruction necessitates a nuanced understanding of teachers' experiences and perspectives. By delving into how English teachers in rural areas of Central Aceh navigate the terrain of AI-enabled writing instruction, this research endeavors to illuminate the intricacies of technology integration within resource-constrained educational environments. Researching AI tool integration in Central Aceh not only fills an evident gap in the existing literature but also offers insights that could be applicable to similar rural settings globally, potentially guiding future educational policy and practice (Liu et al., 2021; Park, 2019; Toncic, 2020; Yang, 2022). By framing Central Aceh as a microcosm for broader rural educational challenges and the potential of AI tools to address these, the study aims to contribute significantly to the discourse on educational equity and technology's role in bridging the urban-rural divide.

As we know, AI has a profound impact on various facets of human life, including the realm of education. With its capacity for automation, AI has the potential to reshape the dynamics of teaching and learning, ushering in fresh challenges and requirements for educators and students alike (Sumakul et al., 2022). In essence, AI stands to transform the methodologies employed by teachers and the approaches adopted by learners, a phenomenon that is particularly pertinent in English as a Foreign Language (EFL) classrooms. In EFL classrooms, the utilization of AI is increasingly commonplace, and an essential consideration in its integration is the extent to which students embrace this technology. The acceptance of

users, as research indicates, serves as a critical determinant for the successful incorporation of technology to enhance performance (Chang et al., 2012; Davis, 1989).

AI indeed has attracted a lot of interest in the field of language teaching due to its potential to facilitate individualized instruction. Numerous articles extol the virtues of AI in the realm of language study. Since the 1980s, when AI was first introduced into language classrooms, it has shown that it can: offer feedback on students' structures (Heift, 2021); actively engage students through written interactions (Long et al., 2021a); process students' language input (Pokrivcakova, 2019); provide more effective grammar feedback (Park, 2019; Toncic, 2020); help students correct their grammatical errors (Park, 2019); improve the quality of the learning experience (Sandu & Gide, 2019); make communication easier (Wenger, 2014); increase students' confidence (Chong et al., 2023; Kelly et al., 2023); increase the rate at which they acquire language (Divekar et al., 2022); and portray the nuance of AI integration among lecturers (Kamarullah, Nuraini, et al., 2024). Taken together, these results highlight artificial intelligence's enormous promise in the field of second language acquisition.

Despite the promising applications of AI in education, research on its integration into English language teaching, particularly in rural contexts like Central Aceh, remains sparse. Studies such as those by Park, (2019) and Qi et al. (2022) have extensively documented the benefits of AI in urban educational settings, yet little is known about its feasibility and impact in areas with significant technological and infrastructural challenges. Furthermore, while researchers like Hapsari and Wu, (2022) have explored AI's role in reducing language learning anxiety, the specific adaptation strategies employed by teachers in resource-limited environments have not been thoroughly examined.

This research seeks to fill these gaps by focusing on how English teachers in rural Central Aceh utilize AI writing tools amidst infrastructural limitations and varying levels of student technological literacy. The purpose of this study is to gain a deeper understanding of teachers' preferences, challenges, and adaptations when integrating AI tools into their teaching practices. This may involve the creation of AI-driven writing assistance platforms or chatbots designed to support students (Wang et al., 2023), not only in urban, but rural areas, providing them with personalized feedback and guidance. In addition, the use of AI in teaching writing can significantly alleviate the resource constraints in rural areas, where there

may be a shortage of English teachers (Pedro et al., 2019). The research should explore the effectiveness of various AI-driven writing tools and platforms available to teachers. This includes identifying user-friendly AI applications and platforms that are suitable for teachers with varying levels of technical expertise.

This study contributes to the broader discourse on AI in education by highlighting the unique challenges and innovative strategies of teachers in a less studied, rural setting. The findings are expected to provide insights that could guide the development of more accessible and effective AI educational tools tailored for similar contexts globally. By documenting the resourcefulness and resilience of rural educators, this research adds a valuable perspective to the literature, which predominantly focuses on more technologically advanced environments. Such insights are crucial for policymakers and educational technology developers aiming to bridge the educational divide between urban and rural areas globally.

Thus, the primary research problem to be addressed is how do English teachers in rural areas of Central Aceh implement the teaching writing with AI, and what are their perspectives on the use of AI in the classroom? To further explore this problem, the research addresses the following questions:

1. What AI writing tools are English teachers in rural areas of Central Aceh using to teach writing?
2. What are the challenges and adaptations associated with implementing AI in teaching writing in these rural settings?

METHOD

Design

The research employed a qualitative phenomenological design to explore the experiences and perspectives of English teachers in rural areas of Central Aceh regarding the use of AI tools in teaching writing as it needs more focuses in education (Muchsin et al., 2022). This design was selected since it aims to understand the lived experiences of the participants and how they make sense of their experiences with AI in an educational context. Phenomenological research is particularly suited to capturing the depth and richness of these personal insights, providing a detailed understanding of the phenomena under study (Cohen et al., 2007).

Participant

The participants of this study were three English teachers acted as informants from high schools in Central Aceh Regency. A purposive sampling, a method particularly suited for qualitative research where the goal is to gain deep insights from specific individuals who have direct experience with the phenomenon being studied (Cohen et al., 2007), was employed to select the participants,. In this case, the phenomenon is the use of AI tools in teaching English in rural areas. As shown in Table 1, the demographic details of the informants, including their years of teaching experience and familiarity with AI tools, are documented to provide context for their perspectives.

Table 1. Demographic of informants

Initials	***Age***	***Gender***	***School***	***Years of Teaching***	***Personality Traits***
BH	*35*	*M*	*SMAN 1 Takengon*	*11*	*Innovative, tech-savvy, patient*
RS	*42*	*F*	*MAN 1 Takengon*	*16*	*Methodical, supportive, adaptable*
IR	*29*	*F*	*SMA Muhammadiyah Takengon*	*5*	*Enthusiastic, creative, open-minded*

Through the communication with the local *Musyawarah Guru Mata Pelajaran* (Subject Teacher Forum, MGMP), the English teachers were carefully chosen based on four specific criteria that aligned with the study's objectives. First, experience with AI tools, where each teacher had demonstrated experience with AI technologies in educational settings. This experience was crucial as it provided a practical perspective on the integration, challenges, and benefits of AI tools in their teaching practices. Next, their selection was based on teaching experiences. The selected teachers had varying years of teaching experience, ranging from 5 to 16 years. This diversity ensured a broad spectrum of insights into how teaching experience might influence the adoption and adaptation to AI tools. Then, their willingness to participate was another consideration. All participants were willing and able to provide in-depth information during the interviews, which was vital for achieving the study's depth of understanding. Representative demographic spread becomes the last criterion. The teachers

represented different schools and backgrounds, providing a cross-sectional view of AI tool usage across different educational environments within the region.

Instrument

The primary data for this research consisted of qualitative data gathered from semi-structured interviews with the participating teachers. The interviews were designed to elicit detailed narratives about their experiences, challenges, and strategies related to the use of AI tools in teaching writing. The source of data was the direct responses from the English teachers, providing firsthand accounts of their interactions with AI technology in the classroom. In details, the research covers variables as follows.

Usage (independent variable) is examined the usage of AI writing tools by English teachers, the frequency of their use, and the specific purposes for which they are used in educational settings. Challenges and adaptations (dependent variable), the former is investigated to provide the difficulties encountered by teachers when integrating AI writing tools into their practices, such as technological barriers or lack of adequate training. The latter is explored to provide the strategies that the teachers develop to overcome the identified challenges and to enhance the effectiveness of the tools in their instructional methods.

Data collecting technique

The data collecting technique used in this study was semi-structured interviews. This approach allows for flexibility in probing deeper into specific areas of interest while ensuring that key topics are covered (Cohen et al., 2007). This study applied Technology Acceptance Model (TAM) proposed by (Davis, 1989) to examine the integration of AI tools in teaching English in rural Central Aceh. It focused on understanding how teachers perceive the usefulness of AI tools in enhancing their teaching effectiveness and student learning outcomes, and the ease with which these tools can be incorporated into everyday teaching practices. The interview was structured around questions that probe teachers' perceptions of both the usefulness and ease of use of popular AI tools like ChatGPT, Grammarly, and Quillbot. The data collected is then analyzed thematically to identify how these perceptions influence the willingness to adopt and continue using these technologies in educational practices.

By leveraging TAM, the study not only investigates the factors influencing AI tool adoption but also provides insights that are essential for designing effective professional development programs and technological interventions. These findings can help policymakers and educational technologists design more user-friendly AI tools and support systems that address the specific needs and challenges of teachers in rural areas.

The interview guide includes open-ended questions designed to explore the following areas.

1. The AI tools and platforms used by the teachers.
2. The challenges and opportunities they have encountered.
3. Their perceptions of the impact of AI on students' writing skills and overall learning experience.
4. The strategies they employ to overcome challenges related to AI integration.

The interview was conducted face-to-face, following the informants' availability and convenience. Each interview was recorded with their consent and transcribed for analysis. The data collected from the interviews are qualitative in nature, consisting of detailed narratives and descriptions provided by the participants. This qualitative data enables an in-depth exploration of the complex phenomena being studied, such as the nuanced ways in which teachers interact with and adapt AI technologies in their instructional practices.

For ethical clearance, this research was conducted following the ethical guidelines provided by internal review board of Universitas Muhammadiyah Mahakarya Aceh. Prior to conducting the interviews, the clearance was obtained to ensure that all research activities adhered to the highest standards of ethical research practice. Participants were informed about the purpose of the study, the voluntary nature of their participation, the confidentiality of their responses, and their right to withdraw from the study at any time without any consequences. Informed consent was obtained from each participant before beginning the interviews, ensuring that they were fully aware of their rights and the use of the data collected.

Data analysis technique

The data analysis technique employed in this study is thematic analysis (Alowayid, 2020; Creswell & Creswell, 2022). It was employed to deeply explore and interpret the qualitative data gathered from interviews. This technique facilitated the identification of themes directly related to our research questions about the usage, challenges, and adaptations

associated with implementing AI writing tools in rural educational settings. It allowed for a structured breakdown of data into themes that succinctly answered the research questions. As the analysis involves identifying, analyzing, and reporting patterns (themes) within the qualitative data, the process includes the following steps:

First, transcribing all audio-recorded interviews to facilitate detailed analysis.Second, familiarization by immersing in the data by reading and re-reading the interview transcripts to become familiar with the content. Third, coding through generating initial codes by systematically highlighting significant phrases or sentences related to the research questions. This process was manual and involved identifying significant phrases or sentences that related directly to the research variables—Usage, Challenges, and Adaptations of AI writing tools. Each segment of data that provided insight into these variables was tagged with a code, which could be a word or short phrase summarizing the essence of that data segment.

Furthermore, it employs theme development by collating the codes into potential themes and sub-themes that capture the essence of the participants' experiences and perspectives. It is then by reviewing themes by refining the themes by checking them against the coded data and the entire dataset to ensure coherence and consistency. Next is defining and naming each theme represents and naming them to reflect their essence accurately. Finally, reporting in the forms of presenting the themes and supporting them with quotes from the informants to illustrate their experiences.

This approach allows for a comprehensive understanding of the teachers' experiences and insights, revealing the nuanced ways in which AI tools are being integrated into English writing instruction in rural Central Aceh.

RESULT AND DISCUSSION

Result

Current AI tools and usage

In this section, we present the AI tools used by the teachers, their usage details, and the reasons for their usage, including both benefits and drawbacks. The teachers in Central Aceh primarily used three AI tools. Each of them is ChatGPT, and then it is Grammarly, and finally it is Quillbot (see Table 2).

Table 2. AI writing tools and usage of the informants

Infor-mants	*AI Writing Tools Used*	*Usage*
BH	*ChatGPT*	*Primarily for generating writing prompts and engaging students in conversational English practice*
	Grammarly	*For grammar and spell-checking, helping improve the accuracy of student compositions.*
	Quillbot	*For paraphrasing sentences and enhancing vocabulary usage*
RS	*Grammarly*	*Used extensively for grammar corrections and style suggestions*
	Quillbot	*Utilized for rephrasing sentences and improving textual coherence*
IR	*ChatGPT*	*Engages students in interactive writing exercises and provides contextual examples*
	Quillbot	*Assists in refining student essays by suggesting better sentence structures*

Table 2 is a structured frequency table summarizing the main themes identified in the thematic analysis, with counts on how frequently each theme was discussed based on the interviews with the informants. Each count in the 'frequency' column represents the number of times a particular theme was explicitly mentioned or discussed in the context of the findings sections. Table 3 provides a quantitative view of the qualitative data, highlighting the most prominent themes in this research.

Table 3. Theme frequency

Theme	*Frequency*	*Description*
Usage of AI writing tools	*12*	*Refers to how teachers utilize tools like ChatGPT, Grammarly, and Quillbot for educational purposes.*
Challenges in implementation	*9*	*Discusses the infrastructural limitations, lack of training, and technological proficiency barriers faced by teachers*
Adaptive strategies	*7*	*Covers the innovative methods teachers use to overcome challenges, such as shared computer time and collaborative learning*

The table shows that the most usage is how teachers employ AI such as Chat-GPT and others to enhance their writing skills. The table is also helped by the diagram as shown:

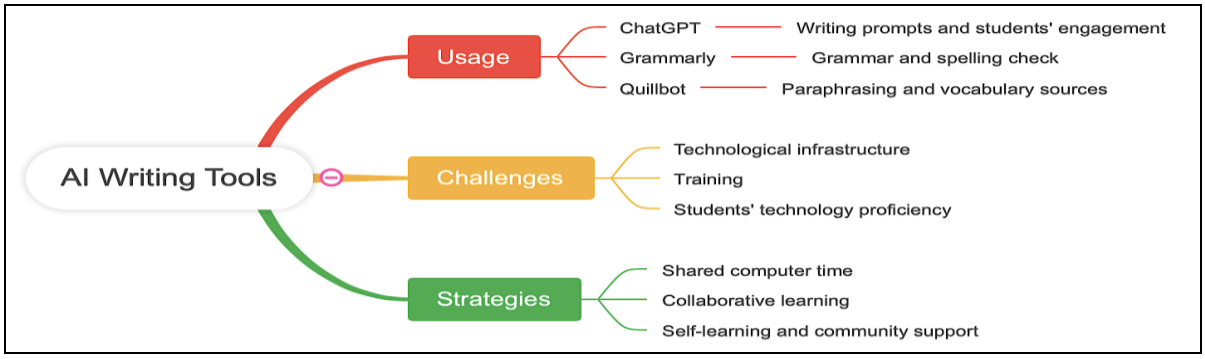

Figure 1. The themes of AI writing tools

As listed in Table 3 and visualized in Figure 1, there are three themes in the issue of using AI writing tools among English teachers in rural areas of Aceh Province, namely the usage of AI writing tools, the challenges experienced by the teachers, and their adaptive strategies. Further findings are showcased in excerpts illustrating the mixed experiences of the teachers with AI writing tools. While they recognize the benefits of these tools in enhancing their teaching and improving student writing, they are also aware of the limitations and potential drawbacks. This balanced view is crucial for understanding the practical implications of integrating AI writing tools into English education in rural areas.

ChatGPT

ChatGPT is used for generating ideas, drafting essays, and providing examples of writing structures. The teachers use it to help students brainstorm and develop their writing skills. These are proved by BH's statements in excerpt 1 (E1) below.

> *E1: I use ChatGPT mainly to generate diverse writing prompts for my students. It also helps in engaging them in conversational English practice, which is crucial for improving their fluency.*

Similarly, IR shares the same argument in E2.

> E2: *ChatGPT is very engaging for students. I use it to create interactive writing exercises and provide contextual examples that make learning more interesting.*

The application, however, has positivity and negativity among the teachers. In E3, BH reveals both effects of the ChatGPT's usage.

> E3: *ChatGPT helps my students generate ideas and draft essays. It's like having a brainstorming partner. However, sometimes the language is too complex, and I need to simplify it for my students.*

When asked about using ChatGPT, RS admitted that the platform is reliable, but it requires more careful validations (see E4).

> E4: *I use ChatGPT to provide examples of writing structures. It saves time, but I need to review the content carefully to ensure it's suitable for my class.*

The excerpts highlight a significant benefit of ChatGPT. It offers diverse writing examples and ideas, which are particularly useful for students who struggle with starting their writing. Additionally, E4 indicates the practical advantage of saving time in preparing teaching materials. However, the drawbacks include occasionally generating content that is not contextually appropriate or accurate for educational purposes and sometimes producing overly complex language that students find difficult to understand. The brief merits and shortages of ChatGPT is showcased in Table 4.

Table 4. ChatGPT's benefits and drawbacks among the informants

ChatGPT	
Benefits	Drawbacks
- Provides diverse writing examples and ideas, which are particularly useful for students who struggle with starting their writing - Assists in developing writing prompts and exercises	- Occasionally generates content that is not contextually appropriate or accurate for educational purposes - May produce overly complex language that is difficult for students to understand

Grammarly

Grammarly is used for checking grammar, punctuation, and style. Teachers use it to help students improve their writing accuracy and coherence. BH and RS admitted the efficacy of the tool in E5 and E6.

> E5: *Grammarly is an essential tool in my classroom for checking grammar and spelling errors. It provides immediate feedback, which helps students correct their mistakes and learn proper grammar usage.*
>
> E6: *I use Grammarly extensively for its grammar correction and style suggestions. It's a fantastic tool for helping students improve the accuracy of their writing.*

Nonetheless, Grammarly has pros and cons for the teachers. RS, for instance, sees the effectivity of the application having minors, particularly for her pupils (see E7).

> E7: *Grammarly is excellent for checking grammar and style. My students' writing has become more accurate. However, it sometimes makes suggestions that are too formal for creative writing assignments.*

As reflected in E8, IR, who does not utilize Grammarly, has strong reasons of her dislike of this writing tool.

> E8: *I know that Grammarly very useful for helping students understand their grammatical errors. But it doesn't always help with the flow of the essay, which is crucial for writing development.*

The excerpts somewhat point out to the benefits of Grammarly, such as offering detailed grammar and style suggestions that help students understand their mistakes and learn correct usage. Even though IR in E8 has contradicted view on Grammarly, but she acknowledged the positive function of the tool. Another drawback proposed by RS in E7, orientation on formal language, indeed may not always be suitable for creative writing tasks, and it is limited in addressing higher-level writing issues such as coherence and argumentation. Table 5 shows the brief benefits and drawbacks of the platform.

Table 5. Grammarly's Benefits and Drawbacks among the Informants

Grammarly	
Benefits	Drawbacks
- Offers detailed grammar and style suggestions that help students understand their mistakes and learn correct usage - Enhances the overall quality of student writing by providing real-time feedback	- Sometimes focuses too much on formal language, which may not always be suitable for creative writing tasks - Limited in addressing higher-level writing issues such as coherence and argumentation

Quillbot

Quillbot is used for paraphrasing and rephrasing sentences. The informants use it to help students improve their vocabulary and find alternative ways to express their ideas. These are agreed by BH's opinion in E9.

> E9: *Quillbot is great for paraphrasing sentences and enhancing vocabulary. It helps students understand different ways to express their thoughts and improves their writing style.*

Correspondingly, in E10, RS delivers similar perspective with BH.

> E10: *Quillbot is used to rephrase sentences and enhance the coherence of student essays. It's particularly useful for students who struggle with expressing their ideas clearly.*

In the meantime, Quillbot also becomes a controversy within the teachers. BH recognizes the side effect of using Quillbot in his teaching (see E11).

> *E11: This paraphrasing tool is great for teaching students how to paraphrase and use synonyms. It expands their vocabulary. But I often need to check the output for awkward phrasing, not to mention its very limited functions in a free version.*

In E12, IR also perceives the bad effect of using Quillbot.

> E12: *I use Quillbot to help students find new ways to express their ideas. It's a valuable tool, but I worry that they might rely on it too much and not develop their own skills.*

The excerpts reflect one of Quillbot's primary benefits: helping students expand their vocabulary by providing synonyms and alternative phrases, as coined by BH in E11. Nevertheless, he also noticed that the Quillbot has shortages that the application can sometimes produce awkward or incorrect phrasing that needs further editing. The drawbacks also include the limited features in standard service of the tool. In addition, emphasizing the concern that over-reliance on the tool might hinder students from developing their own paraphrasing skills. This is complained by IR in E12. Hence, concise merits and shortages of Quillbot is showcased in Table 6.

Table 6. Quillbot's benefits and drawbacks among the informants

Quillbot	
Benefits	*Drawbacks*
- *Helps students expand their vocabulary by providing synonyms and alternative phrases* - *Encourages students to think about different ways to express their ideas, enhancing creativity*	- *Can sometimes produce awkward or incorrect phrasing that needs further editing* - *Over-reliance on the tool might hinder students from developing their own paraphrasing skills*

Challenges and adaptations

In this section, we discuss the specific challenges faced by the teachers when using AI writing tools and the adaptations they have made to overcome these challenges.

Infrastructure and resource constraints

The integration of AI writing tools in teaching English writing in Central Aceh faces significant infrastructure challenges. This is noted by BH in E13.

> E13: *The **lack of reliable internet access** in our area makes it difficult to use AI tools consistently. We often experience **interruptions**, which disrupts the learning process.*

This sentiment is then echoed by RS, as listed in E14.

> E14: *We **have limited access** to computers and other necessary hardware. Many students don't have personal devices, so we have to rely on the school's resources, which are **often insufficient**.*

One of the major challenges faced in the integration of AI technologies into English writing instruction, especially in rural areas, is the lack of adequate infrastructure. Schools often lack reliable internet access and the necessary hardware to implement AI-driven tools effectively. This can be worst if the human resource is weak to steer the digitalized educational platforms. This digital divide significantly hampers the potential benefits that AI can offer.

To mitigate these infrastructural challenges, the teachers have employed various strategies to maximize the available resources. In E15, RS, for instance, mentions her adaptation toward the issue.

> E15: *To address the lack of resources, we **schedule shared computer time** and make the most of the limited devices we have. We also encourage students to **collaborate** and **learn from each other**.*

This collaborative approach not only optimizes the use of scarce resources but also fosters a sense of community and peer learning among students. Additionally, teachers like

BH have started incorporating AI tools in smaller, manageable parts of the lessons to gradually build students' confidence and familiarity with the technology.

Teacher preparedness and training

Another significant challenge is the lack of training and preparedness among teachers. IR explains this in E16.

> E16: *I haven't received any **formal training** on how to use AI tools in teaching. Everything I know is **self-taught**, and it can be overwhelming at times.*

In E17, BH also highlights this issue.

> E17: *There's a steep learning curve with these technologies. Without **proper training**, it's **challenging** to integrate AI tools effectively into the curriculum.*

In response to the lack of formal training, teachers have turned to self-learning and community support networks. To illustrate, IR shared her experiences in E18.

> E18: *I've joined online forums and communities where I can learn from other educators' experiences and get tips on using AI tools more effectively.*

These online communities provide valuable resources and support for teachers navigating the complexities of AI integration, which, in some ways, offer a solution for the obstacle the teachers faced.

Student engagement and acceptance

Student engagement and acceptance of AI tools also present challenges. BH shares his argument toward this topic, which is added by RS (see E19 and E20).

> E19: *Some students **are not very comfortable** with using technology. They find it **intimidating**, which affects their willingness to engage with AI tools. However, not everything is running smoothly, specifically about the students' positive assurances. We've started incorporating AI tools in smaller, manageable parts of the lessons to gradually build students' confidence and familiarity.*
>
> E20: *There's a noticeable difference in how students **interact** with AI tools based on their familiarity with technology. Those who are more tech-savvy tend to **benefit** more, while others **struggle**.*

These observations underscore the importance of fostering a positive attitude towards AI writing tools and providing support to students to ensure they can effectively engage with these technologies. To build students' confidence and familiarity with the tools, teachers have adopted gradual integration strategies. In E19, BH mentioned his strategies to integrating AI writing tools in smaller, manageable parts of the lessons to gradually build students'

confidence. Additionally, in E15, RS emphasized the importance of peer learning, where more tech-savvy students assist their peers, creating a supportive learning environment that encourages all students to engage with the technology.

Discussion

AI writing tools have transformed the landscape of educational technology, offering a myriad of advantages that can significantly enhance both teaching and learning experiences. These tools are not just aids for students but are also invaluable for educators, providing robust support across various aspects of academic work.

Research has consistently highlighted how AI writing tools enhance academic and scientific writing by streamlining processes such as idea generation, content structuring, and efficiency (Cardon et al., 2023a; Khalifa & Albadawy, 2024a). These capabilities allow for more focused literature reviews, efficient data management, and refined editing processes, which are essential in academic settings (Khalifa & Albadawy, 2024b; Pedro et al., 2019b). However, the integration of these tools is not without its challenges. Concerns about maintaining academic integrity, the potential reduction in critical thinking skills, and ethical issues have been notable (Abd-Elsalam & Abdel-Momen, 2023a; Cardon et al., 2023b). These challenges underscore the need for a balanced approach to AI tool usage in educational contexts.

To effectively navigate these challenges, there is a growing consensus on the need for comprehensive AI literacy. This encompasses not just the technical ability to use AI tools but also a deeper understanding of their application, authenticity, accountability, and agency (Cardon et al., 2023b). Developing such literacy will equip students with the necessary skills to leverage AI tools responsibly and effectively. The literacy is also addressed to Indonesian teachers as they are obliged to perform, learn, and report work-related materials from a digital platform provided by the government (Kamarullah, Istiarsyah, et al., 2024).

Experts like (Jacob et al., 2023) and, (Tseng & Warschauer, 2023) advocate for the adoption of pedagogical frameworks that do not merely introduce AI writing tools into the classroom but also teach students how to critically engage with them. This involves teaching students to understand the mechanisms behind the tools, access and select appropriate

platforms, prompt questions that guide AI usage, corroborate the information provided by AI, and incorporate AI-assisted outputs into their academic work. Such frameworks ensure that AI writing tools are used as enhancements rather than replacements for human insight, promoting a balance that is critical in educational settings.

Moreover, the ethical use of AI writing tools in academia remains a pivotal area of concern. Transparency in how the tools are used can help mitigate risks associated with their misuse and ensure that their integration into academic practices remains beneficial (Abd-Elsalam & Abdel-Momen, 2023b; Khalifa & Albadawy, 2024b). These broader discussions set the stage for a more focused examination of how English writing skills, as perceived by EFL teachers like those in (Marzuki et al., 2023), are influenced by AI writing tools in terms of content organization and overall student writing development.

Technological integration and pedagogical strategies

Based on the findings, the study revealed that English teachers in rural Central Aceh predominantly utilize three AI tools: ChatGPT, Grammarly, and Quillbot. Each tool serves specific educational purposes: ChatGPT is primarily employed for generating writing prompts and facilitating conversational English practice; Grammarly is used extensively for grammar and spelling checks to enhance the accuracy of student compositions; Quillbot aids in paraphrasing and vocabulary enhancement. These findings align with the broader educational technology discourse, highlighting the diverse applications of AI tools in enhancing language instruction.

However, regardless the merits, each tool indeed has the drawbacks. ChatGPT, for instance, in Table 4, occasionally generates excessively complicated languages, which is responded by (Kamarullah, Nuraini, et al., 2024) and (Rudolph et al., 2023) as a result of certain languages posing difficulties for the AI. Similarly, as shown in Table 5, the weaknesses of Grammarly are seen in its discrepancies to accommodate advanced writing like the aspects of coherence and reasoning (Marzuki et al., 2023; Nova, 2018; Park, 2019; Toncic, 2020b). The demerit of Quillbot is also proven by the awkward or incorrect phrasing asking for further editing, not to mention the limited features provided in its free version (Qi et al., 2022; Sumakul et al., 2022). These tools also synchronously might pamper the pupils to

rely heavily on them, which contradict to their values in learning process – to assist, rather to take all the control.

Moreover, in the side of the teachers, they indeed still face significant challenges in integrating AI writing tools effectively, primarily due to limited technological infrastructure, the absence of formal training, and students' varying levels of technological proficiency. The inadequate infrastructure not only hinders the consistent use of AI writing tools but also limits the potential benefits these technologies can offer (Pedro et al., 2019; Poedjiastutie et al., 2021), not to mention the incompetence of the teachers themselves to manage the digital-based tools in and out of the classrooms (Kamarullah & Sarinauli, 2023; Meylina et al., 2021).

Despite these barriers, the teachers have developed adaptive strategies to leverage AI writing tools effectively. Shared computer time, collaborative learning, self-learning initiatives, and community support networks are among the methods employed. This adaptability is crucial for maximizing the educational benefits of AI technologies, supporting research by Hapsari and Wu (2022) and (Kamarullah, Nuraini, et al., 2024), which emphasize the resilience and innovation of educators in resource-limited environments. Flexibility and resourcefulness in overcoming infrastructural barriers, predominantly in educational technologies, are a must have skill within educators (Pedro et al., 2019; Wang et al., 2023).

Nevertheless, the integration of AI writing tools in rural education, as evidenced in this study, finds both confirmation and extension in existing literature. The practical implications of using the tools – ChatGPT, Grammarly, and Quillbot, for teaching in resource-constrained environments such as Central Aceh are vividly illustrated by Liu et al., (2021), who document similar utilization patterns in comparable settings. This alignment showcases how AI writing tools can serve to bridge educational gaps despite infrastructural deficiencies.

Moreover, the challenges highlighted in this study—specifically the lack of infrastructure and formal training—are mirrored in the findings of Sumakul et al., (2022). These authors discuss how such obstacles can be mitigated through community-based adaptations and informal learning networks, strategies that have also proven effective in

Central Aceh. This parallel not only validates the local adaptations observed but also enriches the broader discourse on rural education's reliance on AI technologies.

The innovative strategies employed by teachers in Central Aceh Regency to use AI tools effectively, despite notable challenges, underscore a key theme in the work of Marzuki et al., (2023). Their study suggests that the self-taught, grassroots approach to AI integration can lead to significant pedagogical improvements and foster a more engaging learning environment. This interpretation bridges the findings from Central Aceh with broader educational theories on technology adoption and adaptation in under-resourced settings, highlighting both the unique and universal aspects of integrating AI into education.

Challenges and adaptive solutions in rural education

The integration of AI tools in rural education presents both challenges and opportunities, a theme that resonates with findings across multiple studies. Liu et al. (2021) explore the necessity of robust technological infrastructure to support AI integration, an issue paralleled by Sumakul et al., (2022), who investigate how resource constraints can hinder effective implementation. These studies provide a contextual backdrop to the infrastructural challenges noted in Central Aceh, underscoring a common barrier across rural educational settings.

In terms of adaptive teaching strategies, Marzuki et al., (2023) discuss the innovation required in pedagogy when educators lack formal training in AI tools, a scenario that mirrors the self-learning initiatives observed in this study. This perspective is complemented by Wang et al. (2023), whose research on collaborative learning emphasizes the potential of peer-to-peer and community-based educational strategies to overcome technological limitations. As a consequence, the need for targeted professional development programs to equip teachers with the necessary skills and confidence to use AI tools in their teaching practices is compulsory (Pokrivcakova, 2019; Sumakul et al., 2022). Continuous professional development and targeted training programs are essential to equip teachers with the skills needed to leverage AI effectively (Istiarsyah et al., 2024; Kamarullah & Sarinauli, 2023). Additionally, the development of peer-led training sessions within schools could further enhance teachers' proficiency with AI writing tools, leveraging the collective knowledge and experiences of the

teaching staff (Long et al., 2021). These strategies may overcome limited exposure to advanced technological tools and may feel apprehensive about using AI in their classrooms, which is commonly encountered by teachers in rural areas.

Engagement and acceptance of AI technologies are critical for their success in educational settings. Heift, (2021) and Long et al.(2021) provide insights into how students' engagement with AI writing tools can be enhanced by understanding their needs and technological proficiencies. Too, factors such as students' familiarity with technology, their motivation, and the perceived usefulness of AI tools play a crucial role in their acceptance (Chang et al., 2012; Davis, 1989). Peer-teaching among pupils also can bridge the technological familiarity gap and promote inclusive learning experiences (Kelly et al., 2023).

The interpretation of the study's results is strongly supported by theoretical frameworks in educational technology. According to Vygotsky's theory of social learning, the collaborative and peer-learning strategies noted in Central Aceh exemplify the social constructivist approach, which posits that learning occurs effectively within a social context (Palincsar, 2012). This theoretical lens justifies the effectiveness of the adaptive strategies employed by the teachers, reinforcing the necessity and impact of social interactions in learning processes facilitated by technology. Rogers' diffusion of innovations theory also provides a foundational perspective, explaining how the adoption of AI tools in education can be seen as an innovation that requires specific strategies to achieve optimal integration and acceptance (Rogers et al., 2014). This theory supports the observed necessity for informal training and community-based adaptation strategies in rural settings, where formal structures might be deficient or absent.

To address these challenges, several adaptations, considering the optimized pedagogical framework for technological teaching, can be made. Firstly, investment in improving the technological infrastructure in rural schools is paramount. This includes providing reliable internet access and necessary hardware (Pedro et al., 2019). Secondly, professional development programs should be designed to train teachers in using AI tools effectively. These programs should focus on practical applications and hands-on training (Pokrivcakova, 2019). Lastly, incorporating student feedback and fostering a positive attitude towards AI tools through engaging and interactive content can enhance student acceptance and engagement (Chang et al., 2012; Sumakul et al., 2022).

These adaptations demonstrate the resilience and resourcefulness of teachers in Central Aceh Regency as they strive to overcome the challenges of integrating AI into their teaching practices. All in all, these excerpts from the informants highlight the practical challenges and the adaptive strategies employed by teachers to integrate AI writing tools into English writing instruction. By addressing infrastructure constraints, providing adequate training, and fostering student engagement, educators can better leverage AI technologies to enhance learning outcomes.

The findings of this study are expected to contribute to our understanding of how AI writing tools can be effectively integrated into rural educational settings despite significant challenges. They reveal the critical role of adaptive strategies and the potential of AI to enhance educational outcomes in under-resourced areas. This discourse, therefore, underscores the importance of local adaptations, teacher initiative, and the integration of theoretical educational practices into practical applications. Furthermore, it highlights the need for continued research into the deployment of technological innovations in similar contexts globally.

CONCLUSION AND IMPLICATIONS

Conclusion

This research explores the integration of AI writing tools in teaching English writing within the context of rural education in Central Aceh, highlighting the significant challenges and adaptive strategies employed by teachers. The findings reveal that while AI writing tools like ChatGPT, Grammarly, and Quillbot are partially utilized by teachers, their effective implementation is often hampered by limited technological infrastructure, a lack of formal training, and varying levels of technological familiarity among students. Despite these challenges, teachers have demonstrated remarkable resourcefulness, employing strategies such as shared computer time, collaborative learning, self-learning, and community support networks to maximize the benefits of the software. These efforts underscore the resilience and adaptability of educators in underserved regions, contributing valuable insights into the dynamics of AI integration in rural educational settings.

Based on the findings, several suggestions can be made to enhance the effectiveness of AI tools in teaching English writing in rural areas like Central Aceh. Firstly, improving the

technological infrastructure, including reliable internet access and adequate hardware resources, is crucial to support the consistent use of AI writing tools. Secondly, providing targeted professional development programs for teachers can equip them with the necessary skills and confidence to integrate AI technologies into their teaching practices effectively. Additionally, fostering a supportive learning environment through peer-led training sessions and online communities can further enhance teachers' proficiency with the tools. Finally, gradual integration strategies and peer learning should be encouraged to build students' technological confidence and familiarity, ensuring inclusive learning experiences for all students.

Limitation

This research has several limitations that should be acknowledged. The study focuses on a specific geographical region, Central Aceh, which may limit the generalizability of the findings to other rural areas with different contexts and challenges. The research relies on a small sample size of three teachers, which may not fully capture the diverse experiences and perspectives of all educators in the region. Additionally, the study primarily relies on qualitative data from interviews, which may be subject to biases and limitations inherent in self-reported data. Future research could benefit from a larger sample size and a mixed-methods approach to provide a more comprehensive understanding of the integration of AI tools in rural education.

Implication

The implications of this research are significant for policymakers, educators, and technology developers. For policymakers, the findings underscore the urgent need to invest in technological infrastructure and professional development programs to support the effective use of AI tools in rural education. For educators, the study provides practical strategies and insights that can be applied to overcome the challenges of integrating AI technologies in resource-constrained environments. For technology developers, the research highlights the importance of creating user-friendly AI applications that are accessible to teachers with varying levels of technical expertise. By addressing these challenges and leveraging the potential of AI tools, it is possible to bridge the educational gap between urban and rural regions, enhancing the quality of English education and promoting equitable learning opportunities for all students.

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