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| RESEARCH ARTICLE

Impact of ChatGPT on the Academic Writing Quality of Senior High School Students

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| ABSTRACT

Emerging technologies are practical tools for addressing challenges in writing skill development. This study explores ChatGPT's impact on Grade 12 students' writing quality using a pretest-posttest experimental design. Fifty-four Grade 12 TVL students were randomly assigned to control and experimental groups. The participants underwent pretests and posttests and were examined by three raters. The quantitative data was analyzed using statistical tools: frequency, percentage, mean, and t-test. The findings of the study reveal that the academic writing quality of the participants during the pretest was poor and fair for the control group and fair for the experimental group. However, the experimental group's writing quality improved to a satisfactory level during the posttest, while the control group remained fair. Based on the significant difference in writing quality between the control and experimental groups, the study concludes that language models such as ChatGPT can impact the writing quality of Grade 12 TVL students in terms of content, grammar, mechanics, and organization. Therefore, integrating Chat GPT in teaching writing skills can be beneficial and efficient. The study's findings provide a foundation for creating suitable instructional materials and teaching strategies for writing skill development.

| KEYWORDS

AI in Education, CHATGPT, Senior High School Writing, Writing Skills, Academic Writing.

| ARTICLE INFORMATION

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1. Introduction

Writing skills are crucial in today's society, where effective communication is essential (Graham & Perin, 2007). The writing skills of students in the Philippines have been a concern for educators and policymakers. Unfortunately, many students have trouble expressing their ideas and views in writing. This case is especially true for senior high school students who must create excellent written assignments for coursework (Cruz et al., 2019). Despite the availability of various writing tools and resources, the writing skills of these students continue to be challenging (Fidalgo-Blanco et al., 2018). As such, there is a pressing need to explore new approaches to enhance their writing performance effectively.

One approach that has been of great use today is Information Communication Technology (ICT). The use of technology in education has been gaining traction in recent years, with various studies showing its positive effects on learning outcomes (Crompton, 2017). ICT has played a significant role in language learning in recent years. This covers both the use of technology in language learning and assessment, such as Computer-Adaptive Language Testing (CALT) (Gawliczek, 2021) and Computer-Assisted Language Learning (CALL) (Gaikwad, 2013).

The use of technology also addresses the needs of the learners of the current generation. Today's learners are so engaged in technology that they are digital natives. These digital natives have different learning styles and require new approaches to

education that incorporate technology (Prensky, 2001). This technology has opened up new possibilities for language learning and teaching. It provides opportunities for learners to interact with authentic language and cultural resources. It allows learners to engage in meaningful communication with native speakers, enabling them to receive individualized feedback on their language skills (Chik, 2017).

Several studies have shown the constructive impact of ICT on language development. For instance, Džanić and Hasanspahić (2020) conducted a study demonstrating how computer-assisted language learning (CALL) learners exhibit high motivation levels. The findings consistently showed that CALL positively impacts the development of motivation, enthusiasm, and interest among students. The study conducted by Gawliczek et al. (2021) establishes evidence for the effectiveness of Computer-Assisted Language Testing (CALT) in language assessment. By comparing the results of CALT and the Paper and Pen Test (PPT), the study demonstrates CALT's efficacy. Gawliczek et al. (2021) support the claim that implementing the CALT approach enhances the quality of foreign language testing. A similar study on technology in language learning conducted by Yundayan, Susilawati, and Chairunnisa (2021) found that technology is a valuable and practical learning tool to promote students' writing. It helps them improve their writing performance and allows them to have fun activities. Furthermore, ICT has made language learning more accessible and affordable for learners worldwide. According to a report by the British Council (2014), online language learning has made it possible for people to learn languages regardless of their location or financial means.

At present, the emerging and trending technology that can be of great use in education is chatbots, such as ChatGPT. ChatGPT is a sophisticated language model that can provide text-based responses to remarkably human-like prompts (Radford et al., 2019). It is a chatbot that produces replies in response to user input conversationally and naturally (OpenAI, 2023). Various industries, including education, have been utilizing ChatGPT to improve students' learning. However, most of the studies on ChatGPT (Firat, 2023; Lund & Wang, 2023; Mhlanga, 2023; and Sallam, 2023) are out of the context of its impact on the writing skills of learners. The studies do not focus on the potential to advance the academic writing skills of senior high school students in the Philippines. Researchers have yet to investigate it thoroughly. This research aimed to fill this gap by examining the impact of ChatGPT on the academic writing quality of senior high school TVL students. More specifically, this study aimed to determine the level of the academic writing quality of the participants in terms of content, organization, grammar, mechanics, and language before and after using ChatGPT. The result of this study allowed the understanding of the implications of this technology in the teaching of writing and writing skills development. Further, it led to crafting efficient instructional materials by integrating the ChatGPT AI language model.

2. Literature Review

2.1 Technology in Language Learning

Technology has revolutionized language learning, offering a myriad of innovative tools and platforms that cater to diverse learning styles. One of the most significant advantages is accessibility- learners can access language materials and resources from anywhere with an internet connection. Mobile apps, language learning software, and online platforms offer interactive lessons, exercises, and games that make the learning process engaging and dynamic. Additionally, technology facilitates personalized learning experiences, allowing learners to progress at their own pace and focus on areas where they need practice. Features like speech recognition software also aid in improving pronunciation, offering instant feedback to learners (Shadiev & Yang, 2020).

According to Zhou and Wei (2018), computer technology has transformed language acquisition into something ecological and normative rather than just a supplementary tool. The usage of technology can increase students' interest and motivation. Technology offers input, output, and feedback in the target language to language learners. It also gives professors a productive way to arrange the course material and communicate with many students. Teachers can modify their instructional activities and teaching tactics to make the most of the available resources.

Technology is becoming a significant aspect of education. It has significantly transformed language learning by providing students with abundant tools and resources to enhance their language learning experience. Technology has made assisting and enhancing language learning possible. Instructors can modify lessons using technology, which improves language acquisition. The use of technology by educators to support language learning in their students is becoming increasingly important (Ahmadi, 2018).

Technology significantly advances the teaching and learning process in schools and universities, particularly when teaching English as a second language. It helps the instructor give the class a more fun and engaging lecture. Instructors can do much more with technology, like playing English-language videos, songs, movies, and even theater shows. It is essential to education and a valuable tool for educators and students in their learning process. Teachers ought to be role models for using technology to enhance the curriculum, and students can use technology more effectively to improve their language skills (Altun et al., 2021).

Another notable aspect is the abundance of authentic resources available online. Learners can immerse themselves in the language by accessing videos, podcasts, news articles, and social media content in the target language. This exposure to real-world language usage enhances comprehension and cultural understanding. Moreover, technology enables communication and collaboration with native speakers through language exchange platforms or video conferencing tools. These interactions provide invaluable opportunities for practicing conversation skills and receiving feedback from fluent speakers, fostering a more holistic learning experience (Zeng, 2020).

Furthermore, advancements such as artificial intelligence and machine learning have led to the development of personalized learning algorithms. These algorithms analyze a learner's strengths and weaknesses to tailor learning materials and exercises, optimizing the learning process. Virtual reality (VR) and augmented reality (AR) applications have also begun to play a role in language learning, offering immersive experiences where learners can simulate real-life scenarios, further enhancing language acquisition in a practical context. Technology continues to reshape language learning, making it more accessible, engaging, and effective for learners worldwide (Qiu et al., 2023).

2.2 Technology in Writing Skills Development

Technology has revolutionized the development of writing skills, offering many tools and platforms catering to various aspects of writing. Firstly, word processing software like Microsoft Word or Google Docs has simplified the writing process, providing features such as spell check, grammar suggestions, and formatting options. These tools not only assist in correcting errors but also aid in enhancing vocabulary and sentence structure through suggestions and alternatives. Additionally, online writing communities and platforms like Medium, Wattpad, or writing forums provide spaces for writers to share their work, receive feedback, and engage with a larger audience, fostering growth and improvement in their writing skills through constructive critique and exposure to diverse perspectives (Williams & Beam, 2019).

Moreover, technology has made learning resources more accessible than ever before. Online courses, webinars, and writing workshops offered by platforms like Coursera, Udemy, or Skillshare cater to various levels of expertise, providing structured learning modules, exercises, and interactive sessions to hone specific writing skills. Furthermore, writing apps and tools specializing in brainstorming, outlining, or even generating ideas, such as Scrivener and Evernote, or mind mapping software like MindMeister, aid in organizing thoughts and planning content, facilitating a more streamlined writing process. These technologies encourage creativity and instill discipline and structure in a writer's approach (Li & Mark, 2022).

Artificial intelligence and natural language processing advancements have given rise to AI writing assistants like Grammarly or ProWritingAid, which offer real-time suggestions for improving writing style, clarity, and tone. These tools analyze text, providing insights and recommendations to enhance overall writing quality, making them valuable companions for writers seeking continuous improvement. Overall, technology has undoubtedly become an indispensable ally in the development and refinement of writing skills, offering a vast array of resources and tools to support and nurture writers at various stages of their journey (Shadiev & Wang, 2022).

Technology-based writing instruction continues to benefit students' writing outcomes across various contexts, situations, and samples. Teachers can use technology to aid their efforts in providing learners with instruction and practice time, thereby increasing their opportunities to write inside and outside the classroom. (Little et al., 2018). Students can utilize social media platforms such as Facebook, Twitter, YouTube, WhatsApp, and other social media tools to cultivate their daily writing routines and establish regular habits for engaging in more profound conversations with themselves and their peers (Bakeer, 2018).

Technology has significantly impacted the development of writing skills since it offers platforms and resources to assist students with different aspects of the writing process. Some of these are word processors, grammar checkers, and writing tools that provide instant feedback on syntax, grammar, and style. Some social media platforms and virtual writing communities offer spaces for collaborative writing and critique, exposing writers to various perspectives. Interactive courses, writing prompts, and exercises customized to each student's needs through educational platforms and applications make learning more engaging. AI-powered writing tools that use natural language processing provide writers with insightful feedback to help them improve their work's coherence, clarity, and overall style. Digital storytelling tools, virtual reality platforms, and multimedia elements enhance narrative and creative writing skills (Williams & Beam, 2019).

2.3 AI Chatbots in Education

The chatbot is one of the most widely utilized AI tools for supporting instructional tasks (Okonkwo & Ade-Ibijola, 2020). It is a technological tool that fosters interpersonal communication and education. Students may benefit from a more individualized and exciting learning environment (Benotti et al., 2017; Cunningham-Nelson et al., 2019). Chatbots disseminate knowledge with interactive techniques and user-friendly interfaces (Hwang & Chang, 2021). The capacity of chatbots to offer an interactive learning

tool that is not confined by time and place is fueling their prominence, which has become increasingly important with the exponential expansion of the mobile device industry over the past ten years. In 2016, a Georgia Tech computer science professor gained notoriety for creating a virtual teaching assistant using artificial intelligence. Students gave the chatbot Jill highly favorable reviews, and they only appeared to notice something was wrong when their teaching assistant responded promptly at any time of the day (Zhou et al., 2020).

As technology advances, users' increasing familiarity with interacting with digital entities enables them to communicate with technologies through voice or natural language. Today, chatbots are employed in various fields, including marketing, customer service, technical assistance, instruction, and training (Smutny & Schreiberova, 2020). Personal digital assistants like Siri of Apple, Alexa of Amazon, Cortana of Microsoft, and Google Assistant of Google are at the lead of voice recognition and "artificial intelligence" technology and have primarily taken the role of assistants or secretaries for routine chores. The present generation, who grew up in an era of the Internet and cell phones, now expects to use digital tools (Selwyn, 2021). Despite the widespread use of chatbots worldwide, research on their advantages in educational contexts has only been available (Ferrell & Ferrell, 2020). These advantages include giving users a pleasurable learning experience by enabling real-time interaction, improving peer communication skills, increasing learner learning efficiency, and assisting instructors in managing busy in-class activities (Schmulian & Coetzee, 2019).

2.4 ChatGPT's Background and Its Performance

On November 30, 2022, OpenAI released ChatGPT (Generative Pre-trained Transformer). This chatbot attracted attention with its ability to upend conventional assessment techniques, among other things. The user of ChatGPT can type a prompt and get a personalized, in-depth response on various knowledge fields. This chatbot has clearly shown that it can pass exams for medical licensure (Gilson et al., 2023), admission to law school (Choi et al., 2023), and a standard examination for basic physics courses (West, 2023).

Using data-processing methods, ChatGPT can stitch statements in response to a query. Contrary to a person's ability, ChatGPT has access to a wealth of knowledge that is available online. It also employs massive language modeling to identify patterns in the word choices in every prompt and impart knowledge like human writing. While ChatGPT is an effective tool, its capabilities rely on the quality and comprehensiveness of the data set on which it has been trained. With a transformer-based neural network architecture trained on vast amounts of data (Maddigan & Susjak, 2023), ChatGPT possesses advanced capabilities to generate responses to text-based inputs. In reality, ChatGPT does not "know" anything; instead, it creates probable responses based on each word in the lexicon, which are determined by an iterative training process on a sizable body of text.

2.5 ChatGPT: An Exploratory Study of Generative Artificial Intelligence

ChatGPT faces the risk of establishing itself as the ultimate epistemic authority. The possible environmental impact of AI, problems with content filtering, and the possibility of copyright infringement are some of the main ethical difficulties raised by this technology. It is crucial that educators prioritize critical thinking, set clear standards, and provide an example of the safe usage of ChatGPT. ChatGPT is a beneficial tool for teachers creating science lessons, rubrics, and tests. Teachers should critically evaluate any AI-generated resource before adapting it to their unique teaching situations. The researchers used ChatGPT as a research tool to assist in editing and experimenting with various techniques to improve the comprehensibility of the study narrative (Crawford et al., 2023).

While conducting an epidemiological study with internationally accepted criteria and standards, researchers may consider ChatGPT a valuable resource. While assessing the outcomes, it is essential for users to be knowledgeable about the issue and possess a critical mentality. Although there is no denying that AI has the potential to improve scientific publishing and research, it is also essential to consider the hazards and ethical and legal ramifications of its use (Sanmarchi et al., 2023).

The emergence of generative AI has transformative possibilities in the field of education. AI is becoming increasingly important in society's digitization. The potential of AI to automate processes, process massive amounts of data, and deliver predictive insights will continue to transform many facets of our daily lives (Yang, 2022).

2.6 Impact of ChatGPT on Students' Learning

ChatGPT is a natural language processing model that conversationally responds to user inputs. Additionally, it performs exceptionally well on a well-known test that economics classes commonly use nationwide. ChatGPT produced exceptional results, scoring in the 99th percentile for macroeconomics and the 91st percentile for microeconomics compared to students who took the TUCE exam after their fundamentals course. This finding has a significant implication for educators (Geerling et al., 2023).

ChatGPT has many advantages, including but not limited to encouraging personalized and interactive learning and creating prompts for formative assessment activities that give continuing feedback to guide teaching and learning (Baidoo-Anu & Owusu, 2023).

Regarding climate research, ChatGPT can benefit in several areas, such as model parameterization, data analysis and interpretation, scenario creation, and model evaluation. With the help of this technology, researchers and decision-makers now have a potent tool for creating and analyzing various climate scenarios based on multiple data inputs and for enhancing the precision of climate projections. The author admits enquiring about chat GPT's applications in climate change research (Biswas, 2023).

ChatGPT also has its impact on the medical field, which included (1) improved scientific writing; (2) utility in health care research (effective dataset analysis, code generation, and literature reviews; saving time to concentrate on experimental design; and (3) advantages in health care practice (streamlining the workflow; cost savings; documentation; personalized medicine; and improved health outcomes). Thus, ChatGPT is implemented in the medical field (Sallam, 2023).

2.7 Ethical Challenges in Generating Scholarly Contents with ChatGPT

When given a request, ChatGPT automatically creates a response based on thousands of online resources, frequently without further user input. As a result, reports indicate that people have used ChatGPT to create academic papers and essays. Upon request, the system can provide supporting references. The ChatGPT functionality underlines the growing demand for adopting strict AI author criteria in scientific publishing. When AI generates academic material, there are numerous ethical questions around authorship, copyright, attribution, and plagiarism. These issues hold particular significance as current anti-plagiarism software and human readers cannot discern whether the content is generated by AI (Liebrenz et al., 2023).

ChatGPT can considerably promote academia and librarianship in both anxiety-provoking and thrilling new ways. Rather than abusing it or allowing it to abuse us in a rush to advance scholarly understanding and train the next generation of professionals, it is critical to think about how to use this technology responsibly and ethically and to identify ways that we, as professionals, can work alongside it to improve our work (Lund & Wang, 2023).

Everyone knows the wonders of artificial intelligence (AI) in today's world. AI has impacted numerous fields, including medicine, education, security, access control, and surveillance. The rapid advancements in AI have simplified difficult jobs in everyday life (Guleria, 2023). Furthermore, users can utilize ChatGPT without any monetary expenditure. OpenAI's management has indicated that the free access is temporary, and they intend to generate revenue from the software in the future. One business model for the platform would incorporate some paywall, which might solidify current global disparities in scientific publication. Institutions in socioeconomically privileged regions may be able to afford access. At the same time, those in low- and middle-income nations may be unable to, exacerbating already-existing gaps in scientific publishing and knowledge diffusion (Liebrenz et al., 2023).

3. Methodology

3.1 Research Design

The study employs a quantitative pretest-posttest control group quasi-experimental research design. This research design aims to determine significant changes in the research groups resulting from the experimental intervention. It involves two groups: a control group and an experimental group, with the latter receiving the treatment. This research assessed the intervention's effectiveness by analyzing the pretest and posttest results.

3.2 Research Locale

The researcher conducted this study in the Senior High School of Mindanao State University-Lanao del Norte Agricultural College (MSU-LNAC), situated in Sultan Naga Dimaporo, Lanao del Norte province, Philippines. MSU-LNAC is one of the eleven campuses of Mindanao State University, a peace university in the country.

3.3 Research Participants

The Grade 12 TVL Students of MSU-LNAC Senior High School who are officially enrolled for the school year 2023-2024 served as the participants of this study. These students had completed their Reading and Writing Skills and English for Academic and Professional Purposes courses, which made them most fit to be the study's participants.

3.4 Instruments

This research utilized a prompt-based writing test. This instrument is pre-constructed by the researcher and the subject teacher. The prompt-based writing test is a 60-minute writing test that requires participants to compose a position paper. A position paper is one of the academic writing requirements of TVL students, as reflected in the curriculum guide for Reading and Writing Skills and English for Academic and Professional Purposes.

3.5 Data Gathering Procedure

The researcher randomly assigned the participants to the control and experimental groups to obtain data. The grouping followed the simple random sampling using a randomizing application. The researcher then conducted the writing pretest for both the control and experimental groups. In this test, participants composed a three-paragraph position paper for one hour. Three raters checked the written compositions of the participants using a rubric. The three raters consist of the subject teacher, an English teacher within the institution, and another English teacher outside the institution. An interrater reliability test was conducted to test the reliability of the scores. An interrater reliability test is a test that determines the consistency or agreement between two or more raters or observers as they evaluate or check the same outputs or test answers. The method used by the researcher to test the reliability of the scores from the three raters is the Fleiss Kappa.

The average scores from the three evaluators were treated using Frequency and Percentage. The result determined the level of writing quality of the participants in the control group and the experimental group during the pretest. The grouping and administering of the pretest was executed on the first day. On the second day, the experimental group was exposed to ChatGPT for one hour, while the control group did not receive any intervention. The one-hour exposure to ChatGPT covered twenty minutes of orientation on how to use the chatbot and forty minutes of practice drills using ChatGPT and generating sample model compositions for the students to observe and follow. After the experimental group's exposure to ChatGPT, both groups took the writing posttest. The posttest result was used to determine the level of writing quality of the participants in the control and experimental groups during the posttest.

3.6 Data Analysis

Appropriate statistical tools were used to accurately interpret the gathered data and ensure the validity and reliability of this study. Thus, the researcher utilized four statistical tools: Fleiss Kappa, Frequency and Percentage, standard deviation, and t-test.

4. Results and Discussion

To determine the impact of ChatGPT on the writing quality of the participants, the researcher analyzed the gathered quantitative data with equivalent verbal interpretation using different statistical instruments. Prior to the analysis, the researcher conducted an inter-rater reliability test using Fleiss' Kappa. With the pretest and posttest scores for the control and experimental groups, the Kappa value is equivalent to one (1.00), which means the three raters have a perfect agreement beyond chance. The test is made to establish the reliability of the test results from the three raters. The interpretation of the data is based solely on the result of the analysis.

4.1 Levels of Academic Writing Quality of Participants during Pretest

4.1.1 The Control Group

The academic writing quality of participants in the control group during the pretest was labeled *poor* and *fair*. The equal frequency of scores in the range of zero to four and five to eight, with an equivalent percentage of 48%, are shown in Table 1. The academic writing quality of this group exposes a significant fraction of performances that fall short of the expected norm. This distribution emphasizes the importance of targeted interventions and support mechanisms in addressing the issues that many students encounter.

Table 1

Academic Writing Quality of Control Group during Pretest

Range of Average Scores	Frequency	Percentage	Verbal Interpretation
13 to 16	0	0	Outstanding
9 to 12	3	11.11	Satisfactory
5 to 8	12	44.44	Fair
0 to 4	12	44.44	Poor

These issues that the intervention may address are the content, organization, grammar, mechanics, and language. The insufficiency of these factors causes the low writing quality of the students, which is clearly shown in their written composition during the pretest. The participants needed to demonstrate a clear purpose, focus on one significant main idea or topic throughout, meet length requirements, and have enough knowledge of the topic. Secondly, the written compositions failed to achieve a clear organization and effective paragraphing; they failed to use appropriate transitions with emphasis on conveying the relationship between ideas.

The introductory paragraph is meant to lay down the topic and stimulate the readers' interest to read further, but in the composition of CG21, the introductory paragraph still needs to achieve this purpose. The student directly presents the reason for using Facebook and Messenger. In addition, the student also needs a clear focus as to which to emphasize the effect of Facebook and Messenger or areas where these social media applications can be used. In terms of content, CG21 and CG13's composition lacks consideration for the potential benefits of online resources and communication outside traditional class hours and has failed to thoroughly explore the challenges mentioned. In addition, there are grammar errors reflected in their composition, such as, ***"Facebook and messenger usually a distraction to our studies."*** In this sentence, there is the missing verb. This can be corrected *as "Facebook and Messenger are usually distractions to our studies."* Second, ***"this will also a great way to let students restricted from toxicity caused by social media***". This sentence also reflects a missing verb which can be corrected to "*This will also be a great way to restrict students from toxicity caused by social media.*" Third, ***"the time of study in every subject they didn't learn any thing because they use Facebook."*** The word "any thing" is an obvious error in this sentence. In addition, the sentence should use a past progressive tense form of the verb. This could be improved into "*During the study time for every subject, they did not learn anything because they were using Facebook.*" Fourth, ***"The using of Facebook is something can decrease our stress but also can be the began in stress."*** For this sentence, the writer use 'the using" instead of "the use." There is also the lack of relative pronoun "that" which will introduce the subordinate clause. A correct sentence should be "*The use of Facebook can decrease our stress, but it can also be the cause of stress.*"

As for the mechanics, the student needed to capitalize the first letter in the sentence, place a period at the end of the sentence, and use commas in enumerated items. These can be seen in sentences such as "***enforced this regulation can also be implemented to teachers."*** In this sentence, the student failed to place a clear subject and end the sentence with a period. The suggested correction for this will be "*This regulation can also be enforced and implemented with teachers.*" Second, ***"Messenger is that way of communicate to our family, friends and other people surrounding to use contact us if there is emergency or something that they message."*** This sentence shows the error in using prepositions and failed to use the Oxford comma which is needed to separate the last item in the series of enumerated items or ideas. This sentence can be corrected into *"Messenger is a way to communicate with our family, friends, and other people around us to contact us in case of an emergency or for any other messages."* Lastly, some words and tones may not be appropriate; thus, they failed to use effective words and expressions that can convey the idea; for example, the words ***"toxicity"*** and ***"distraction"*** can be replaced with the terms "*adverse effect," "unhealthy atmosphere,"* and *"interruption."* If these are addressed, these students' writing quality may reach outstanding quality.

The absence of scores in the outstanding range (13-16) indicates that exemplary performances are not recorded in the dataset. This stimulates reflection on potential barriers to outstanding writing quality output, such as appropriate teaching methods and approaches or the need for specific enrichment options. The satisfactory range (9 to 12), which accounts for only 12% of instances, indicates a small number of students fulfilling the baseline expectations in academic writing. This raises issues about the characteristics contributing to satisfying performance and prompts thoughts for scaling effective strategies to a larger student group.

In Table 1, the discrepancy between low and high scores highlights a varied landscape of student achievement. With over half of the participants falling into the poor group (0–4), it is clear that many students struggle to fulfill the desired requirements. In contrast, the lack of scores in the outstanding range (13 to 16) raises concerns about the school system's ability to encourage outstanding success. This disparity in low and high scores not only reveals current educational disparities but also provides educators and administrators with an opportunity to implement policies that foster a more inclusive and balanced learning environment.

4.1.2 The Experimental Group

Most of the participants (44.44%) in the experimental group scored 5-8 during the pretest, meaning their writing quality was *fair*. Table 2 shows that 40.74% of the participants got a score of 0-4, which is interpreted as poor-quality writing. This finding reveals that the experimental group had the same writing quality as the control group during the pretest, where most participants struggled to write satisfactorily.

Table 2

Academic Writing Quality of Experimental Group during Pretest

Range of Average Scores	Frequency	Percentage	Verbal Interpretation
13 to 16	0	0	Outstanding
9 to 12	4	14.81	Satisfactory
5 to 8	12	44.44	Fair
0 to 4	11	40.74	Poor

Table 2 shows the lack of scores in the outstanding range (13 to 16), meaning no students got extraordinarily high scores during the pretest. The satisfactory level (9 to 12) was 15.38%, demonstrating a small number of students fulfilling the baseline expectations. This small percentage of satisfactory writing quality in the experimental group supports the need for a more in-depth exploration of the aspects that lead to good academic writing performance. The result intensifies the need for investigation into potential barriers to exceptional performance, encouraging educators to assess if the teaching techniques appropriately support students within this range or if changes are required to raise performance levels.

The lack of quality in the different aspects of writing that will lead to quality academic writing is evident in the writing compositions of participants EG22 and EG25 from the experimental group. The experimental group's writing quality level, which is the same as the control group, implies the same writing problem in the content, organization, grammar, mechanics, and language. Some of the errors incurred by participants EG12 and EG25 in terms of the aforementioned writing skills, which made their writing quality marked as *fair*, are as follows:

In terms of grammar errors, the first example is ***"The Facebook and Messenger is helpful for the student to know what are the announcement in a class."*** In this sentence, the student needed to have used the correct number of the verb. The sentence should use the plural form of the verb; therefore, the sentence should be "*Facebook and Messenger are helpful for the student to know what the announcements are in a class.*" Second, ***"And it is bad if you abuse it."*** This sentence should not start with a conjunction. This can be improved into "*It is bad when abused.*" Third, ***"In other hand, this app have a bad impact if you abuse it and you never want to take inside in a class."*** The student use the correct expression *"On the other hand."* They should also use the singular verb "has" to agree with the singular subject "app." The suggested correction for this sentence would be, "*On the other hand, this app has a harmful impact if you abuse it, and you never want to bring it inside a class.*" Fourth, ***"The application which is facebook and messenger are commonly use today."*** The student should use applications to refer to the two applications being discussed in the sentence. In addition, "use" should also be changed to "used." Lastly, the initial letter of the word "facebook" should be capitalized since it is the proper name of a brand. This can be corrected as "*The applications, which are Facebook and Messenger, are commonly used today.*" Fifth, ***"Facebook and Mesenger, this application include chat and videocall."*** This sentence clearly shows the lack of a verb and faulty construction. The suggested correction is "*Facebook and Messenger are applications that include chat and video call.*" Lastly, ***"If the school administration improve a strict regulation in the use of facebook and messenger in the campus."*** The student commits an error in the subject-verb agreement where the sentence needs a singular verb which can be improved to "*If the school administration improves a strict regulation on the use of Facebook and Messenger on the campus.*"

In terms of Mechanics, these are some of the sample errors: First, ***"In our generation, this app is helpful, specially In the student to know what they want to know in a class."*** The sentence shows capitalization, spelling, and preposition errors. "Specially" should be changed to especially, and a comma should be used to separate intervening phrases. The correction for this will be, "*In our generation, this app is helpful, especially for the students to know what they want to learn in a class.*" Second, ***"In other hand, this app have a bad impact if you abuse it and you never want to take inside in a class."*** This sentence should also use a comma to separate the intervening expression. This should be corrected into "*On the other hand, this app has a bad impact if you abuse it, and you never want to bring it inside a class.*" Third, "***The application which is facebook and messenger are commonly use today."*** The sentence needs the necessary comma to separate Facebook and Messenger from the subject. In addition, there is also the need to capitalize the initial letter of facebook and messenger since they are the proper name of applications. The corrected sentence will be, "*The applications, Facebook and Messenger, are commonly used today.*" Fourth, the ***"Disadvantage in facebook and messenger is if youre account is hacking your information, see it."*** In this sentence, there is also a need to capitalize proper nouns in the sentence. This sentence can be improved into "*The disadvantage of using Facebook and Messenger is that if your account is hacked, your information may be compromised.*"

In terms of language errors, here are some examples: First, ***"In our generation, this app is helpful, specially In the student to know what they want to know in a class,"*** To increase the quality of this sentence, terms and expressions such as specially, in the student, and to know what they want to know in a class should be changed, such as "*In our generation, this app is beneficial*

for students who want to find information related to their classes." Second, ***"And also you can find a fight when you arguing your co-student about in a class."*** The sentence sounds rude with the use of the word fight. Thus, it will be better to change it and add transitional words to introduce the sentence. The correction for this sentence will be, "*Additionally, you may encounter conflicts when arguing with your classmates in class.*" Third, ***"Facebook and Mesenger this application include chat and videocall."*** This sentence can be improved by adding an appropriate verb and a word that defines the term video call, such as Facebook and Messenger are applications that include chat and video call features. Lastly, ***"Messenger and facebook is many scammer, so don't be alert always."*** In this sentence, the student may use appropriate words like cautious to signify the idea of giving a warning to the readers, like, for instance, "*Messenger and Facebook have many scammers, so always be cautious.*"

The *fair* and *poor* levels of the control group and the *poor* level of the experimental group are similar results in the study conducted by Hikmah et al. (2019). Their study shows that twenty (20) student-participants were poor in mechanics. They had errors in the usage of punctuation, capitalization of proper nouns, proper indentation of the paragraph, and sentence breaks. Their participants are also poor in grammar. Specifically, the students had more errors in subject and verb agreement, proper usage of tenses, organization of thoughts, contracted words, and distribution of thoughts per sentence. These different errors are similar to the errors and insufficiency of the participants in the current study. The raters have low scores given to the written composition regarding their grammar and mechanics, organization, and language. The results of Hikmah et al.'s study and the findings of the current study prove that these students' writing skills continue to be a challenge (Fidalgo-Blanco et al., 2018).

4.2 Level of Academic Writing Quality of Participants during Posttest

The level of academic writing quality of participants during the posttest means the level of the writing quality of the experimental group after exposure to ChatGPT, while the level of writing quality of the control group is during the posttest without intervention. The data used to determine the frequency and percentage were the tabulated scores from three raters.

4.2.1 The Control Group

Most of the participants in the control group got a *fair* rating for their written outputs during the posttest. Table 3 shows that no scores in the outstanding category were obtained during the posttest, indicating a lack of extraordinarily high performance. The table also shows a significant change in the number of students whose writing quality is satisfactory, earning 40%, and a decrease in the number of students with poor quality, earning 24%. The increase in the satisfactory category from 11.11% during the pretest to 37.04% during the posttest indicates that a large proportion of pupils meet or moderately meet the desired writing skills.

Table 3

Academic Writing Quality of Control Group during Posttest

Range of Average Scores	Frequency	Percentage	Verbal Interpretation
13 to 16	0	0	Outstanding
9 to 12	10	37.04	Satisfactory
5 to 8	11	40.74	Fair
0 to 4	6	22.22	Poor

The unimproved level of academic writing of this group may be greatly attributed to their inability to use correct grammar. This means that students committed grammatical errors. This is evident in their score under the grammar and mechanics, organization, and language criteria. It is believed that technical terms, slang, and idiomatic expressions with implied meanings are obstacles in written communication (Srisitanon, 2009, as cited by Polpo, 2019). The result implies a need for intervention for the students to improve their writing quality. This intervention can be the use of technology since various studies have already shown its positive effects on learning outcomes (Crompton, 2017). In addition, technology-based writing instruction is educationally relevant and impactful on writing outcomes (Little et al., 2018). The use of technology allows students to enhance their writing by adding more precise detail to their writing pieces, and it initiates self-revisions (Sandolo, 2010). Lastly, this unimproved writing level could also be attributed to the lack of access to a database of information like ChatGPT. When students have access to a database of information like ChatGPT, they will have a continuous, uninterrupted, and smooth flow of writing since they can easily employ information, especially appropriate terms and expressions, needed in their writing. This concept is supported by the Connectivism Learning Theory by Siemens and Downes (2024), which explains that technology can become a source of varied information needed in learning.

The lack of quality in content, organization, grammar, mechanics, and language that led to fair writing quality of the control group during the posttest is evident in the writing composition of participants CG21 and CG13. The quality of their written composition serves as the basis for further implications. In the written composition of CG21, the entire composition already demonstrates the lack of mechanics. There is no clear paragraphing; there are words that should be capitalized but were not applied by the student,

for example, the word "messenger." The needed punctuations are not also used in the composition. In the sentence ***"while we are inside the campus this regulation can also be implemented..."*** a comma is needed after the word campus. Observing sample compositions generated from ChatGPT, students may be reminded of the proper use of punctuation. The length of CG21 and CG13's compositions suggests that the content is insufficient. As reflected, every paragraph does contain more than one supporting sentence to develop the topic sentence. If these students were using ChatGPT, they could generate ideas and concepts that would serve as hints and suggestions for them to develop as discussions in their paragraphs. In the sentences ***"facebook and messenger is already giving a big help..."*** and ***"websites is amazing, specially..."*** of CG21' and CG13's compositions, respectively, it is evident that the students failed to observe the rules of the subject-verb agreement. The subjects of the two sentences are plural and, therefore, need plural verbs.

4.2.2 The Experimental Group

Table 4 shows the level of writing quality in the experimental group after its exposure to ChatGPT during the posttest, where 46.15% of the participants achieved a *satisfactory* level of academic writing quality. Also worth noting in the results is that written outputs with an *outstanding* level increased from 0 to 12%, while the *satisfactory* level increased from 15.38 to 46.15%. The graph also shows a percentage decrease in the *fair* and *poor* level of writing.

Table 4

Academic Writing Quality of Experimental Group during Posttest

Range of Average Scores	Frequency	Percentage	Verbal Interpretation
13 to 16	3	11.11	Outstanding
9 to 12	12	44.44	Satisfactory
5 to 8	9	33.33	Fair
0 to 4	3	11.11	Poor

This improvement is evident in the writings of the participants in the experimental group during the posttest. In the written composition of respondent EG22, the respondent's pretest is *fair*, with an average score of 5.33, while his posttest is *satisfactory,* with an average score of 11.00. The participant's written composition illustrates a clear and well-organized paragraph. The same improvement is manifested in the pretest and posttest results of respondent EG25, whereby the respondent's writing quality during the pretest was *fair* with its average score of 6.00, which increased to a *satisfactory* level with an average score of 10.00. The respondent's composition showed adequate language and an appropriate tone for the target audience. In addition, the sentences are correct with minor grammar errors, which does not greatly affect readers' understanding.

The adequacy of language and the correct sentences are clearly illustrated even in the introductory paragraph. The student-writer can use more appropriate words such as prominent, argumentation, and promote. Furthermore, the student-writer can use transitional words such as however, secondly, and lastly. This result, where there is an increase in the level of academic writing quality, can be attributed to students' exposure to a language model, in this case, the ChatGPT. This technology can provide personalized feedback and support, engage and motivate learners, and support language skills development (Baskara, 2023). This is possible since ChatGPT can give a quick response that is systematic, precise, and original (Kumar, 2023). The response provided by ChatGPT will serve as a model composition that the students can observe and follow to improve their writing. This follows the Social Learning Theory of Albert Bandura (1977), which posits that individuals learn from their environment and the people around them by observing, imitating, and modeling behaviors that they perceive as successful or rewarding. With the generated writing composition that serves as a model, students could improve their organizational skills by following the organizational structure made by ChatGPT. In the introduction of EG22's composition, it is evident that the student can structure it following the use of questions in making an introduction. The student-writer organizes the sentences that will lead to the introductory hook in the paragraph.

The change in the writing quality level of the experimental group from pretest to post-test serves as an initial basis that ChatGPT can positively impact the writing quality of the students through the increase of their scores and specifically the increase of the quality of their content, organization, grammar, and mechanics, and language. The increase in motivation and ease of writing also serves as an impact of chatGPT as it allows access to a database of information and sample compositions that will serve as a model for them to follow.

4.3 The Degree of Difference between the Posttest Scores of the Control and Experimental Group

The posttest average scores of the control group and the posttest average scores of the experimental group were analyzed using a t-test. As shown in Table 5, the comparison between Variable 1 (Control Group) and Variable 2 (Experimental Group) indicates a significant difference in their central tendency and variability. The Control Group has a mean of 7.49. In contrast, the Experimental

Group has a mean of 8.94, revealing higher values than the Control Group. The Control Group has a slightly larger variance (6.93) than the Experimental Group, indicating that the Control Group has a broader distribution of values.

Table 5

Degree of Difference between the Posttest Scores of the Control and Experimental Group

Statistical Analysis	***Variable 1***	***Variable 2***
Mean	7.493827	8.938272
Variance	6.926242	6.487496
Observations	27	27
df	26	
t Stat	-2.429120557*	
P(T<=t) one-tail	0.011175615	
t Critical one-tail	1.70561792	
P(T<=t) two-tail	0.02235123	
t-tab value	2.055529439	

* = Significant

The t Stat of -2.43 indicates a *significant* difference between the means of the Control Group and the Experimental Group. Both p-values (0.011 for one-tail and 0.022 for two-tail) are less than the standard significance level of 0.05, indicating that the null hypothesis of no difference in means should be rejected. The negative t Stat indicates that the Control Group has lower values than the Experimental Group. The key t-values for the one-tail and two-tail tests support the conclusion that the difference between the two groups is statistically significant. The statistically *significant* result of the t-test, with its t Stat of -2.43, serves as evidence that there is a significant difference between the groups being compared, and this difference is not due to chance but rather due to the intervention employed, which is the ChatGPT. The satisfactory sample compositions from the control and experimental groups during the posttest illustrate the impact of ChatGPT on the students' writing quality.

A significant difference is evident when comparing the composition of CG08 from the control group with the composition of EG12 from the experimental group. In terms of content, EG12 demonstrates better than CG08. EG12's composition contains more details that support the topic sentence in every paragraph. This may be attributed to the student's exposure to ChatGPT. The additional details and ideas may be taken from a similar composition that ChatGPT generated during the trial and drill of the students while using the chatbot. Looking into the proper use of punctuation, CG08 already incurred errors, even in the first two sentences. Instead of a period, a comma was used after the word grammar, while the needed comma after the word classes is not written in the sentence. ***"Editing software like Grammarly is to correcting of your grammar; in writing classes, it help us, specially to all students who cannot master their grammar."*** In the same sentence, it is also evident that CG08 failed to follow grammar. The second sentence requires a singular verb, "helps," but the student uses the plural verb "help." On the other hand, the errors in the grammar of EG12 are minimal.

ChatGPT has an impact on writing skills, specifically on the following: first, it can level up the content of the composition since, using ChatGPT, it can provide additional information about the topic as it serves as a database of information that students can access. This is evident in the composition of EG08, who was exposed to chat ChatGPT, as compared to CG05, who was not exposed to ChatGPT before writing his composition. Respondent EG08's composition was able to discuss more details about the advantages and disadvantages of the topic, while CG05's discussion was just a mere personal opinion.

Second, it strengthens the organization of the composition since the student-writer has sample compositions generated in the ChatGPT, which will serve as a model for the students to observe and follow. This sample composition becomes an efficient model since it is derived from an architecture trained on vast amounts of data (Maddigan & Susjak, 2023). This is evident in the composition of EG08, where his introduction is structured in a way that situations are written first before the questions that serve as a hook, which helps in motivating the reader to read further while compared to CG06's composition, the paragraph state three topics which do not serve the purpose of an introduction.

Third, students exposed to ChatGPT exhibit better grammar and an increased vocabulary in their compositions. They learned to use verbs correctly in terms of number and tense. Those exposed to ChatGPT could follow grammar, especially with the use of appropriate verbs in terms of number and tense. In terms of mechanics, the proper use of periods and commas is also observed better in the compositions of those exposed to ChatGPT. The written composition of EG08 shows how punctuations are properly used as compared to CG24.

This impact with the use of ChatGPT became possible since this chatbot can give users a pleasurable learning experience by enabling real-time interaction, improving peer communication skills, and increasing learner learning efficiency (Schmulian & Coetzee, 2019). In addition, ChatGPT can deliver instant feedback, offering advice on syntax, grammar, and vocabulary, which can help pupils become more fluent in language abilities (Baskara, 2023). Furthermore, ChatGPT increases their motivation, leading to a more productive and quality writing output since the target learners are the digital natives who grew up in an era of the internet and cell phones and have the expectation of using digital tools (Selwyn, 2021).

The significant difference between the posttest average scores of the control group and the experimental group, which signifies the difference in their writing quality level, implies that ChatGPT can impact the students' writing quality. This is consistent with the assumption that incorporating AI language models like ChatGPT into educational settings might improve learning outcomes. According to research, natural language processing technology can improve writing skills (McCormick et al., 2020). This is made possible since ChatGPT can provide an individualized and interesting learning environment (Benotti et al., 2017; Cunningham-Nelson et al., 2019).

The findings of this present study validate the claim of Godwin-Jones (2022), as cited by Su et al. (2023), that ChatGPT can be used to improve students' academic writing quality. According to Godwin-Jones, proficiency in using AI tools is an important dimension of digital literacy. This technology enhances writing efficiency, improves language accuracy, and increases writing confidence (Ningrum, 2023). The overall result of this study supports the assumption that ChatGPT can positively impact students' academic writing quality.

4.4 The Instructional Material that can be developed Based on the Findings of the Study

The written compositions of the experimental group during the posttest showed improvements in terms of content, grammar, mechanics, organization, and language. These improvements were demonstrated in the compositions of the participants after they were exposed to sample compositions drawn from ChatGPT during the posttest. Based on these findings, this study presents a prototype module that will facilitate the growth of students' language proficiency through tasks and activities using language models such as ChatGPT that provide students a chance to practice their writing abilities and get inputs on how they are doing. The module is intended to be a dynamic learning tool featuring exercises actively engaging students with ChatGPT by observing, analyzing, and comparing their works from the drawn samples in the app. By incorporating ChatGPT in this way, the educational materials utilize modern language technology and provide students with a practical and participatory method to improve their writing skills. This integration is consistent with the more significant educational trend of integrating cutting-edge technologies to improve learning results (Rogers, 2014).

The module consists of three activities. Activity 1 aims to help students recall and learn new words they see in the sample compositions generated in the ChatGPT. This activity will strengthen their knowledge of new words in terms of their meaning, synonyms, and antonyms. Activity 2 targets the learning of different punctuation marks and their uses. Through this activity, students will observe or analyze how punctuation marks are used in the sample composition they generated from ChatGPT. Activity 3, on the other hand, will allow students to recall their knowledge about the rules of the subject-verb agreement and the tenses of the verb. This activity will help them master the correct use of verbs.

5. Conclusion

This study probed the impact of ChatGPT on the academic writing quality of senior high school students. It used a quasi-experiment to find any significant difference in the academic writing quality of the respondents in the control and experimental groups where exposure to Chat GPT is an intervention given to the latter. The study found a significant difference in the academic writing quality of the respondents before and after their exposure to the ChatGPT. The respondents' writing quality improved in content, organization, grammar, mechanics, and language. Hence, ChatGPT can be a promising tool that teachers can use to teach writing skills by modeling sample texts extracted from the AI tool. ChatGPT can assist students in generating ideas and in identifying errors in their writing. While this study shows that ChatGPT can benefit teachers and students, it has limitations. The scope of this study was restricted to the examination of data from the writing pretest and posttest of only one strand of senior high school students, specifically the Technical Vocational and Livelihood (TVL) students in a specific senior high school. Also, the study did not include the assessment of other factors that may affect the students' writing quality, such as their personal motivation, writing experience, and learning styles. Future researchers may enhance the present study in the context of other areas of language teaching and learning. Studies that will look into the impact of ChatGPT on the academic writing quality of students in different learning tracks among senior high schools may be conducted. Future studies may also investigate the challenges of using ChatGPT as a learning resource for writing skills development and the efficacy of AI Chatbots in addressing the common writing challenges of senior high school students.

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