TECHNICAL UNIVERSITY OF COTOPAXI

PUJILÍ CAMPUS

DEPARTMENT OF NATIONAL AND FOREIGN LANGUAGE PEDAGOGY

ENGLISH MAJOR

RESEARCH PROJECT

"Grammarly and QuillBot in supporting a deaf English learner's writing academic task"

Research report before obtaining the bachelor's degree in National and Foreign Language Pedagogy, English Major

Author:

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PUJILI-ECUADOR OCTOBER

2023 – MARCH 2024

DECLARATION OF AUTHORSHIP

I, Paredes Gambóa Sofia Alejandra, with ID number 1850159474, declare myself as the authors of the following RESEARCH PROJECT: "GRAMMARLY AND QUILLBOT IN SUPPORTING A DEAF ENGLISH LEARNER'S WRITING ACADEMIC TASK", Paulina Alexandra Arias Arroyo, PhD., serves as the Tutor of this work. I expressly release the Technical University of Cotopaxi and its legal representatives from any potential claims or legal actions.

Furthermore, I certify that the ideas, concepts, procedures, and results presented in this research work are solely my responsibility.

Pujilí March, 2024

Sofia Alejandra Paredes Gambóa
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ENDORSEMENT FROM THE PROJECT TUTOR

As the Tutor of the Research Project titled:

"GRAMMARLY AND QUILLBOT IN SUPPORTING A DEAF ENGLISH LEARNER'S WRITING ACADEMIC TASK" by Paredes Gambóa Sofia Alejandra, from the Department of National and Foreign Language Pedagogy English Major, I believe that the aforementioned Research Report deserves approval endorsement for meeting the technical standards, translation, and prescribed formats, as well as for incorporating the observations and recommendations proposed during the pre-defense.

Pujilí March, 2024

Paulina Alexandra Arias Arroyo, PhD.
ID.0502212095
TUTOR

APPROVAL ENDORSEMENT FROM THE GRADUATION COMMITTEE

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As the Readers' Committee, we hereby approve the present Research Report in accordance with the regulatory provisions issued by the Technical University of Cotopaxi and its Pujilí Extension. The applicant, Sofia Alejandra Paredes Gambóa, with the title of the Research Project: **"GRAMMARLY AND QUILLBOT IN SUPPORTING A DEAF ENGLISH LEARNER'S WRITING ACADEMIC TASK"**, have taken into consideration the recommendations issued in a timely manner and possess sufficient merits to undergo the thesis defense.

Based on the aforementioned, authorization is granted to record the corresponding files on a CD, in accordance with institutional regulations.

Pujilí March, 2024

For the record, they sign:

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GRATEFULNESS

At this significant moment in my academic career, I would like to express my sincere gratitude to those who have been crucial in this great step. To God, for being my source of strength and spiritual guidance. To my pets, for their comforting companionship during study nights. To my friends, for their unconditional support and shared laughter. To my family, for their sacrifice and constant love. A special thanks to the Universidad Técnica de Cotopaxi, my academic home, for providing me with a favorable environment and resources that have been fundamental in my educational path. To my thesis tutor Arias Paulina. PhD, I would like to express my deep gratitude for her expert guidance, patience and dedication at every stage of this project. Your mentorship has been essential to my academic growth and I am grateful for the opportunity to learn under your guidance. Finally, to my professors, sincerely thank you for sharing your valuable insights and inspiring me to strive for excellence in my learning. This achievement is the result of the contribution of all of you. Thank you all.

DEDICATION

This research project is dedicated to all of you, my family and friends, for being my unwavering support system. Your love and friendship have been my greatest inspiration and motivation to achieve this milestone. To my beloved parents, grandparents and brother, who have been the solid foundation on which I have built my dreams; your unconditional love, support and wisdom have been the light that has guided me on this academic journey. And finally, although it may seem unusual, it is also dedicated to my cat, furry companion and silent witness of my study sessions, your comforting presence has also been an essential part of this journey. With eternal gratitude, Sofia.

TECHNICAL UNIVERSITY OF COTOPAXI DEPARTMENT OF

NATIONAL AND FOREIGN LANGUAGE PEDAGOGY ENGLISH MAJOR

TITULO: GRAMMARLY Y QUILLBOT EN EL APOYO A LA TAREA

ACADÉMICA DE ESCRITURA DE UN ESTUDIANTE DE INGLÉS SORDO.

Author:

Sofia Alejandra Paredes Gambóa

RESUMEN

La investigación se centró en analizar el uso de Grammarly y QuillBot para apoyar las tareas de escritura académica de un estudiante sordo de inglés en la Universidad Técnica de Cotopaxi entre abril y agosto de 2023. Se empleó un enfoque cualitativo con metodología descriptiva para explorar a fondo las percepciones de los participantes respecto al uso de estas dos herramientas tecnológicas. Los métodos de recopilación de datos incluyeron entrevistas y tareas escritas completadas por el estudiante sordo, con la asistencia de un intérprete de lenguaje de señas. Los datos de las entrevistas fueron sometidos a análisis temático, mientras que las tareas escritas fueron evaluadas utilizando rúbricas, y finalmente, se utilizó una tabla de comparación para diferenciar los aspectos positivos y negativos del uso previo y posterior de Grammarly y QuillBot en la tarea de parafrasear. Los resultados de la entrevista revelaron los desafíos que los estudiantes sordos enfrentan en tareas académicas escritas, como el significado de las palabras, la confusión en la comprensión del inglés y problemas en la formación de oraciones. La entrevista también proporcionó percepciones positivas y negativas respecto a Grammarly y QuillBot. Como aspecto negativo, se destacó el bajo conocimiento que el estudiante sordo tenía sobre el uso de estas herramientas tecnológicas. Como aspectos positivos, el estudiante proporcionó opiniones sobre las propiedades que Grammarly y QuillBot ofrecen, como la corrección de palabras, la corrección de estructuras gramaticales, variedad de sinónimos y parafraseo. Destacó la efectividad de QuillBot en tareas de escritura académica mediante el uso de sinónimos y la calidad de las oraciones en las tareas. Se hicieron recomendaciones para la implementación de programas y talleres destinados a mejorar las habilidades de escritura de estudiantes sordos de inglés y promover la integración de estas tecnologías para facilitar la educación inclusiva y mejorar las habilidades de escritura dentro de este contexto académico distintivo.

Palabras claves: Estudiante sordo, Grammarly, Percepciones, QuillBot, Tareas escritas.

TECHNICAL UNIVERSITY OF COTOPAXI DEPARTMENT OF NATIONAL AND FOREIGN LANGUAGE PEDAGOGY ENGLISH MAJOR

THEME: GRAMMARLY AND QUILLBOT IN SUPPORTING A DEAF ENGLISH LEARNER'S WRITING ACADEMIC TASK.

Author:
Sofia Alejandra Paredes Gambóa

ABSTRACT

The research focused on analyzing the use of Grammarly and QuillBot to support the academic writing tasks of a deaf English student at Technical University of Cotopaxi between April and August 2023. A qualitative approach with descriptive methodology was employed to thoroughly explore participants' perceptions regarding the use of these two technological tools. Data collection methods included interviews and written tasks completed by the deaf student, with the assistance of a sign language interpreter. The interview data were subjected to thematic analysis, while the written tasks were evaluated using rubrics, and finally, a comparison table was used to differentiate the positive and negative aspects of the before and after use of Grammarly and QuillBot in the paraphrasing task. The results of the interview revealed the challenges that deaf students present in written academic tasks such as word meaning, confusion in English comprehension, and problems in sentence formation. The interview also provided positive and negative perceptions regarding Grammarly and QuillBot. As a negative aspect highlighted the low knowledge that the deaf student had with the use of these technological tools. As positive aspects the student provided opinions regarding the properties that Grammarly and QuillBot offered such as the correction of words the correction of grammatical structures, variety of synonyms and paraphrasing. She highlighted the effectiveness of QuillBot in academic writing tasks by using synonymous and the quality of sentences in the tasks. Recommendations were made for the implementation of programs and workshops to enhance the writing skills of deaf English students and promote the integration of these technologies to facilitate inclusive education and improve writing skills within this distinctive academic context.

Keywords: Deaf student, Grammarly, Perceptions, QuillBot, Written tasks.

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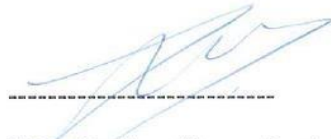Carrera de
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AVAL DE TRADUCCIÓN

En calidad de Docente de la Carrera de Pedagogía de los Idiomas Nacionales y Extranjeros de la Universidad Técnica de Cotopaxi; en forma legal **CERTIFICO** que:

La traducción del resumen al idioma español del proyecto de investigación cuyo título versa: **"GRAMMARLY AND QUILLBOT IN SUPPORTING A DEAF ENGLISH LEARNER'S WRITING ACADEMIC TASK"** presentado por: Sofia Alejandra Paredes Gambóa, egresada de la Carrera de: **Pedagogía De Los Idiomas Nacionales Y Extranjeros**, perteneciente a la **Extensión Pujilí** lo realizaron bajo mi supervisión y cumple con una correcta estructura gramatical del Idioma.

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Pujilí, marzo del 2024

Atentamente,

PhD. Paulina Alexandra Arias Arroyo
ID:0502212095
TUTORA

Índex

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1.- GENERAL INFORMATION

Theme: Grammarly and QuillBot in supporting a deaf English learner's writing academic task.

Starting Date: October 2023

Ending Date: March 2024

Place of Research: Technical University of Cotopaxi

Sponsoring Faculty: PUJILI CAMPUS

Sponsoring career: National and Foreign Language Pedagogy English

Linked Research Project (if applicable):

Macro project of the career:

Research Group: Sofia Alejandra Paredes Gambóa

Work Team: Arias Arroyo Paulina Alexandra, PhD.

Paredes Gambóa Sofia Alejandra

Knowledge area: Education

Research line: Education, communication and graphic design for human and social development.

Research line of the career (if applicable): Pedagogical, didactic, curricular and inclusive practices in the areas of knowledge.

2.- PROBLEM STATEMENT

Writing is a skill that all university students need to develop. One of the human communication processes is writing that allow people to express thoughts and ideas, which involves representing a language with legible symbols through the use of alphabetic letters, punctuation marks, and spaces (Jabar, 2020). While it is true that for university students, it is difficult to develop written assignments. Al Fadda (2012) states that "students face many difficulties and stresses in their academic writing, including those caused by distinguishing between spoken and written styles in English texts" (p. 123). Which can also be a real challenge for students with disabilities, in this case, hearing impairments. In fact, Berent et al. (2007) noted that "most deaf students find it extremely difficult to learn many of the most basic English grammatical structures in many writing tasks, which becomes a major barrier to the development of general English writing skills" (p. 8).

Commonly, students with disabilities have some problems developing written academic tasks, since they have an impoverished vocabulary. Deaf learners are generally found to have a smaller English vocabulary than their hearing peers (Sarchet et al., 2014, p.1). This may be because the strategies employed by educators to teach English to this particular group of students, are used in the same way as with the group of students without disabilities. Domagala (2016), when referring to English teachers, mentions that "within the methodology for teaching English as a foreign language to deaf and hard of hearing students, they use general teaching and learning strategies as long as they are effective for the needs of the students" (p. 135). It is emphasized that the use of the strategies can be used in a general way, but with the condition that both students with hearing impairments and the rest of the students are included, which allows teachers to emphasize the adaptation of these strategies to cover the needs that they present.

English Learners with this type of disability may face certain challenges. According to Malik & Din (2019), it was established that: "[...]researchers have identified challenges for deaf writers in terms of grammar, spelling, and punctuation at one hand (lower order skills), while generating ideas, sequencing, and revising the content on the other" (p.3).

however, technology is quite effective today in developing writing activities, such as Grammarly and QuillBot. Fitria, (2022) states that "Grammarly is the most powerful tool that users can use to check for errors in the written task" (p. 66), and also another tool that helps students in the development of written works is QuillBot. Xuyen, (2023) mentioned that "through the review of previous studies on QuillBot, it is clear that QuillBot is of great use in helping students overcome the challenges in academic writing" (p. 22). These are two examples of software that enables the editing and paraphrasing of academic papers.

For this reason, this study aims to analyze the use of Grammarly and QuillBot as a support in writing academic tasks in a deaf English learner of the Technical University of Cotopaxi, during April- August 2023. It should be noted that the activities were carried out with the help of a sign language interpreter, who facilitated communication with the hearing-impaired student. Therefore, the research question was: How can the use of Grammarly and QuillBot support a deaf English learner in writing academic tasks?

3. RESEARCH OBJECTIVES

General objective

To analyze the use of Grammarly and QuillBot as a support in writing academic task in a deaf English learner of the Technical University of Cotopaxi, during April- August 2023

Specific objectives

To explore the major themes and concepts associated with hearing impairments. and writing skills in English learning.

To identify the challenges a deaf English learner has in writing tasks.

To determine the perceptions of a deaf learner after the use of Grammarly and QuillBot for writing academic tasks.

To examine the effect of the use of Grammarly and QuillBot in a deaf learner's writing task.

4. Activities and task system in relation to the objectives proposed.

Tabla1

Objetives and activities

Specific objectives	Activities	Verification Means
To explore the major themes and concepts associated with hearing impairments and writing skills in English learning.	Conduct a literature review	Theoretical Framework
Identify the challenges a deaf English learner has in writing skills.	Apply an interview to deaf learner.	Consent form Interview transcription (Previous knowledge)
To determine the perceptions of a deaf learner after the use of Grammarly and QuillBot for writing academic tasks	Apply an interview to a deaf English learner about the use of the experience after using the two technological tools.	Consent form Interview (after use) Interview transcription Discussion

To examine the effect of the use of Grammarly and QuillBot in a deaf learner's writing academic task.	Evaluate a written task before and after the use of technological tools.	Tasks Rubric Results

5. JUSTIFICATION

In recent years, technology's involvement in language learning has risen at an unprecedented rate, touching a diverse variety of student demographics in amazing ways. In today's academic context, effective writing is essential for success in higher education. However, deaf students learning English as a second language may face unique challenges in the development of their writing skills.

This research is grounded in the need to improve and optimize the academic writing process for deaf students, recognizing the importance of providing specific tools that address their unique linguistic needs. The academic focus of this project is based on the premise that by using technologies such as Grammarly and QuillBot, designed to improve grammar and facilitate text production, significant progress can be made in the writing skills of deaf students.

In addition, this project has significant methodological implications for improving the teaching and learning of deaf English language learners. By understanding how Grammarly and QuillBot can be employed as support tools in academic writing tasks, educators will be able to adapt their teaching techniques, and students will be able to integrate these tools effectively into their writing processes. The practical application of the findings of this research can directly contribute to the optimization of language and technology support programs, thus improving the educational experience of deaf students at the Technical University of Cotopaxi.

The present research is based on the evident predisposition of both the student and the interpreter to access and actively participate in the research process. Both parties demonstrated a genuine interest in contributing to the development of knowledge in the corresponding area of study. This predisposition has manifested itself through a constant commitment to the exploration of relevant topics, the proactive search for resources, and the willingness to overcome the challenges inherent in the research process. The student, as the main protagonist of this project, has shown a clear inclination towards acquiring new knowledge and a deep understanding of the topics addressed.

Her intrinsic interest was reflected in her active participation in academic activities, the autonomous search for relevant sources, and the manifestation of an explicit desire to delve deeper into the field of research. On the other hand, the interpreter, as a key facilitator in this process, demonstrated a strong commitment to building effective bridges between the student and the relevant information.

In addition, the researcher has the necessary knowledge and relevant experience to carry out a comprehensive study in the field of these two technological tools. Her academic background, characterized by a deep understanding of the key concepts and relevant methodologies, places her in an ideal position to address the challenges posed by the proposed research. The researcher has demonstrated her ability to design and execute the research effectively, making use of these technologies.

6. SCIENTIFIC AND TECHNICAL FOUNDATION

Background

In this context, Ludlow et al. (2019) analyzed the development of technology and its use in students with hearing impairments who presented problems in skills such as writing. The researchers used an exploratory methodology. Their results were

positive in terms of the use of technological tools; the improvements in writing Academic and thinking skills of deaf students were remarkable; and the use of online programs has been shown to improve the extent of complexity and the use of varied vocabulary. And concluded that the use of technology allowed for active form development and skill development through the use of various technological applications, and that these digital tools and online environments can increase the ability of teachers to effectively deliver content, communicate, and prepare students with hearing impairment.

On Technologies for Disabilities, a study by Mishra et al. (2010) analyzed the types of disabilities, both visual and auditory, and how information and communication technologies [ICT] help to solve these types of problems in learning and developing skills such as writing. According to the ICT analysis, both software and hardware are positive, and have great advantages over these types of disabilities such as: homework assistance, information search, and learning new material in different subjects. The researchers concluded that new digital technology software (online tools) has the potential to be a very effective tool for promoting the inclusion and education of people with disabilities. Teaching materials should be created with the needs of all people with disabilities in mind, eliminating the conventional barriers of distance and mobility.

Baglama et al. (2018) conducted a study to analyze the use of technologies in the teaching and development of skills for people with hearing impairments using a qualitative method based on the analysis of documents related to this topic, which was mentioned in Grammarly and QuillBot. They concluded that the use of technological tools by this type of person has positive effects while contributing to writing Academic skills such as sentence construction and the correct use of verb tenses. Therefore, the use of computers and online tools are essential.

The study conducted by Fitria (2021), which consisted of an analysis of the effectiveness of academic tasks of paraphrasing and summarizing using QuillBot

in university students, employed a descriptive qualitative research approach and yielded positive results. Fitria mentions that the tool offers various ways to correct and enhance writing academic tasks, such as the use of synonyms, paraphrasing by altering the form of the word, paraphrasing using active or passive sentences, and rearranging the order of words in sentences. Additionally, the author suggests that QuillBot serves as an alternative for students to use as assistance when they are unable to perform these tasks manually.

These findings suggest that online technological tools such as Grammarly and QuillBot can be effective in supporting the writing process for deaf learners.

Theoretical Framework

English language acquisition in university settings involves a number of critical concerns that impact the learning process. This theoretical framework will examine inclusive pedagogy with respect to a student with hearing impairment, emphasizing the difficulties they experience when learning English. Specific issues they face in academic writing tasks, such as paraphrasing, will also be addressed. In addition, the role of technological tools such as Grammarly and QuillBot in the development of writing skills will be investigated, explaining their benefits and drawbacks in writing tasks, as well as their modes of use. This analysis will help to better understand the essential aspects involved in the process of learning English at the university level.

Learning English as a Foreign Language

Given the undeniable influence of English as a global means of communication, underscored by its pivotal role in business, academia, and tourism, the demand for English as a foreign language (EFL) has become increasingly imperative.

Vonkova et al. (2021) mention that: "English has become an indispensable tool for global communication. Due to the prominence of English as the lingua franca of

business, academia, and tourism, there is a need for English as a foreign language (EFL)"(p.30).

In the exploration of language learning, Quimosing (2022) states that :

> Foreign language learning refers to learning a non-native language, which is only learned in a formal classroom and not commonly used in the community. The exposure to the language is less than that of the second language (L2), and sometimes it is connotatively referred to as an "alien" language (p. 13).

This reinforces the notion that, despite its formal setting, EFL plays a crucial role in bridging linguistic gaps and fostering cross-cultural understanding.

Learning English at the university.

Learning English within the university is one of the aspects that are recognized   important because allows to achieve communicative advantages and skills development. The role of English extends beyond mere communication, encompassing active engagement in various academic activities such as writing articles, participating in discussions, debates, and delivering speeches.

According to Haeriati & Lodo, (2023) English is one of the important aspects possessed by university students. Apart from being an international language that will support communication with other people, especially now that there are many supporting references for lectures that use English, the students need to improve English language skills, English is not only used to communicate directly but also to support students to increase their knowledge and lectures. Activities by writing articles, participating in discussions, debates and speeches in English.

Recognizing the multifaceted utility of English, university students are compelled to hone their language skills as an integral aspect of their academic journey, ensuring they are well-equipped for the diverse demands of contemporary education and beyond. This multifunctional role underscores the notion that English proficiency is not merely a linguistic skill but a tool that empowers students to enhance their

knowledge base and actively contribute to academic discourse. As universities increasingly incorporate English into various facets of learning, the imperative to cultivate and refine English language skills becomes not only a communicative necessity but also an essential component in the academic journey of university students.

Inclusive Pedagogy

Inclusion in education refers to the creation of educational environments that are accessible and equitable for all, regardless of their individual characteristics.

According to the United Nations Educational, Scientific, and Cultural Organization [UNESCO] (2023), an inclusive approach to education means that all students participate and succeed together and that the requirements of each person are taken into consideration. It recognizes that every child has different qualities, interests, skills, and learning requirements, and that all children are capable of learning. Learners who could be in danger of marginalization, exclusion, or underachievement receive extra attention.

Inclusive pedagogy focuses on creating equitable and accessible learning environments for all students, regardless of their background or abilities (Thomas & May, 2010). In the context of learning English at the university, inclusive pedagogy involves employing teaching strategies that address the diverse needs of learners and foster a sense of belonging and participation. By fostering an environment that values inclusivity, educators not only enhance the academic experience but also contribute to the development of a sense of belonging and active participation among learners. Thus, the application of inclusive pedagogy in the realm of English language education at the university level not only facilitates linguistic development but also promotes a more enriching and supportive learning journey for all.

Inclusive Education in Ecuador

The enactment and effective implementation of educational laws that contribute to the creation of a more inclusive and equitable educational environment, fostering

equal access to educational opportunities and the holistic development of all students, are important.

[LOEI]. Ley No. 675 (2023). Article 153. Educational inclusion guarantees the full right to quality education through continuous access to learning, participation, promotion, and completion of all students in the National educational system in the different modalities and levels, with an educational environment that provides physical and emotional well-being in the priority population.

In general, these types of legal provisions underscore the importance of equal opportunity in education and the need to create an educational environment that is accessible, inclusive and promotes the well-being of all students, regardless of their differences.

Curricular Adaptations

In the implementation of special adaptations to the curriculum for students with Special Educational Needs (SEN) linked to disabilities, a rigorous analysis is crucial. This involves a thorough examination of individualized requirements, considering factors such as learning styles, preferences, and strengths, and tailoring the curriculum accordingly (Ministerio de Educación, 2013).

The analysis is multifaceted, addressing specific challenges faced by students with SEN and identifying areas within the curriculum that may require modification. Educators collaborate with special education professionals and other stakeholders to ensure a comprehensive understanding of the diverse needs of each student.

Continuous assessments and reassessments are integral components of this ongoing analysis. These evaluations not only monitor the effectiveness of the adapted curriculum but also facilitate adjustments as students' progress. The collaborative

efforts among teachers, special education professionals, and stakeholders contribute to a holistic approach, emphasizing the holistic development and well-being of students with SEN (Ministerio de Educación, 2013). A detailed and continuous analysis of adaptations to the curriculum ensures that educational practices remain responsive to the evolving needs of students with SEN. This approach promotes an inclusive and supportive educational environment, aligning with the guidelines established by the Ministerio de Education.

Work with deaf students in Ecuador

Recognizing the specific needs of deaf students, the Ministry of Education (2019) has introduced the Bilingual Bicultural National Educational Model for People with Hearing Disabilities in Ecuador. This model is designed to address and acknowledge the diverse characteristics within the deaf population. Additionally, in its Guide for Pedagogical Strategies to Address Special Educational Needs, provides valuable insights into effective approaches for working with deaf students.

Strategies recommended for working with deaf students include:

Utilizing resources and visual materials to reinforce teaching methods.

Incorporating activities that engage the sense of touch and integrating images to facilitate student expression.

Familiarizing educators with basic words in sign language as a means of communication.

Encouraging clear and natural articulation of words to facilitate lip reading.

Modifying the classroom layout to promote visual contact among students.

Facilitating peer tutoring with a classmate to provide additional support.

Analyzing these strategies reveals a comprehensive approach aimed at addressing the unique communication and learning needs of deaf students. The emphasis on visual aids, tactile engagement, and familiarity with sign language underscores a

commitment to creating an inclusive and accessible learning environment. Moreover, the incorporation of peer tutoring recognizes the importance of peer support in enhancing the educational experience for deaf students.

The Ministry of Education's initiatives and recommended strategies reflect a proactive stance in catering to the diverse needs of deaf students, fostering an environment where they can thrive academically and socially.

Hearing impairment.

It is a type of disability that mainly affects hearing and does not allow the person to hear. The ear is the element of the body that is responsible for hearing. Hearing provides us with information about the world. Anyone who hears nothing around him, regardless of how loud the sound is, is likely to have an ear condition. It is a condition or, more precisely, an impairment that is a physical, visible state of tissue that can influence the function of the organ system of which that tissue is a component (Nwadinobi & Nwadinobi, 2019).

Causes of hearing impairment

Hearing impairment can be caused by various factors, and it may occur at different stages of life. Word Help Organization [WHO] (2023) mentioned different causes:

Prenatal Period: Genetic factors and hereditary influences, as well as non-hereditary hearing loss, may occur due to intrauterine infections during the prenatal period.

Perinatal Period: Factors during childbirth, such as asphyxia resulting from oxygen deprivation, low infant weight, and insufficient developmental support in childhood and adolescence, can contribute to hearing impairment.

Childhood and Adolescence: Chronic ear infections, known as otitis, fluid accumulation in the ear, untreated meningitis, or infections in adulthood can lead to hearing loss during childhood and adolescence.

Chronic Diseases: Smoking-related issues or conditions like Otosclerosis, neurosensory degeneration due to aging, and sudden sensorineural hearing loss fall under the category of chronic diseases contributing to hearing impairment.

Factors Across the Lifespan: Various factors throughout life, including wax blockage or accumulation in the ear, head trauma or injuries, exposure to extreme noises or sounds, ototoxic drugs or chemicals, hate or viral infections, and genetic predisposition, can result in hearing loss.

Type of characteristics of deaf individuals

The volume or intensity of a sound is determined by its sound pressure level, measured in decibels (dB). The following characteristics outline the impact of hearing loss at different levels:

Individuals with mild hearing loss (20-40 dB) generally do not encounter difficulties in language acquisition but may struggle with understanding oral expression and written language.

Those with moderate hearing loss (40-70 dB) often experience challenges in articulation and face difficulties in social communication.

Individuals with severe hearing loss (more than 90 dB) may encounter problems in cognitive development due to information deprivation, leading to impulsive actions. This can manifest in challenges related to abstraction, reasoning, and reading comprehension.

Vision plays a crucial role in sensory and motor functions for individuals with hearing loss.

Socio-affective development is impacted, with reduced communication and interaction due to information gaps.

Deaf individuals may struggle to interpret emotions through pitch, intensity, and voice rate, relying on visual cues. The lack of information can give rise to feelings of distrust, egocentrism, and occasional impulsive actions (Agular et al., 2008).

Sign language Interpreter

Sign language interpreters are professionals specialized in the translation and interpretation of sign language, allowing communication between deaf people and hearing people who do not know sign language. An interpreter helps a hearing person and a deaf person communicate so that they can have useful interactions. They guarantee that the deaf community's members will have access to information and a range of opportunities; sign language is used for message interpretation (World Association of Sign Language Interpreters [WASLI], 2014).

Challenges in learning English to Deaf learners

Deaf people may have some problems learning the English language. Hearing problems may have a severe impact on a child's capacity to learn, communicate, and interact. Hearing impairment, unlike being deaf, is an invisible handicap, and hence its effects are not evident to others (Mubin et. al, 2022). In learning English, the main problem of deaf students is their lack of hearing and speech which are affected by their imperfect pronunciation. Even the students have limited spoken vocabulary in English (Megawati, 2020).

Marschark (2006), it was certain that the difficulties in educating deaf pupils that are commonly attributed to reading and writing were not literacy-related at all. He saw that deaf pupils made the same kinds of mistakes in reading and writing as persons learning English as a second language. This observation, however, was made on pupils at a higher grade level. It is unknown if the same trend would apply to deaf elementary school students.

Also noted that these challenges mirrored the mistakes made by individuals learning English as a second language, rather than being exclusive to literacy struggles. It's essential to highlight that Marschark's observations were predominantly focused on pupils at a higher grade level. As a result, the applicability of the same trends to deaf elementary school students remains an open question. Further exploration and research would be necessary to ascertain whether the patterns observed in older

students hold true for their younger counterparts in elementary education. This nuanced perspective prompts a deeper investigation into the specific challenges faced by deaf elementary school students in the realms of reading and writing.

Eisenbraum et al. (2011), observed that learners who were deaf or hard of hearing employed a variety of communication methods, which had educational consequences. Unfortunately, some of these students were in classrooms where the professors did not know sign language and a sign language interpreter had to be called in to offer sign language interpretation.

Atar et. al, (2021) state that:

> Another important problem is that learning environments must adapt accordingly since it is clear that they have low levels of language skills and in their motor skills if support is provided in this regard, deaf individuals can face difficulties about their disability and will be able to integrate into society instead of excluding and isolating themselves (p.24).

Overall, it highlights the need to address the language and motor barriers faced by deaf people in learning environments, and stresses the importance of providing the necessary support to ensure their full integration into society.

Academic Writing

Wilson, (2019), mentioned that academic writing differs from creative writing, journalism or transactional writing in its purpose. While creative writing entertains, journalistic writing informs, and transactional writing communicates, academic writing seeks truth. It serves as a means to explore and understand the world around us, uncovering truths, origins, and knowledge.

Every piece of academic writing aims to contribute new ideas or insights to the field in question. Originality is paramount, as it moves the writer from being a mere recipient of knowledge to a creator of knowledge. Types of academic writing assignments can be essays, paraphrasing, research, book reviews, summaries, synthesis and literary analysis.

Writing

Writing skill refers to the ability to express ideas, thoughts and messages through the use of written words. This skill involves the ability to organize and structure language coherently and effectively to communicate a message in a clear and understandable manner. Durga & Rao (2018) mention that:

> Writing is one of the four skills –LSRW (listening, speaking, reading and writing) in language learning. It is the system of written symbols, representing the sounds, syllables or words of language, with different mechanisms - capitalization, spelling and punctuation, word form and function (p. 1).

The significance of writing as a communicative tool underscores its role in language learning, contributing to a comprehensive and nuanced understanding of linguistic expression.

Types of writing academic tasks

Writing skills encompass various forms and styles, from writing academic essays, newspaper articles, and emails to crafting creative narratives, poetry, and digital content. It includes the ability to use grammar, syntax, and vocabulary accurately and appropriately for the specific purpose and audience.

Pourdana et al. (2011) stablished that:

> Writing activities in second/foreign language classes, according to a commonly recognized classification, are either real-world assignments that are directly focused on the learners' communicative goals, or pedagogic tasks that are aimed to increase students' genre knowledge and composing abilities, the pedagogical

exercises attempt to increase specific academic skills, such as better punctuation, pre-writing ability, or a better comprehension of rhetorical structures and the activities are chosen based on metacognitive criteria, or what pupils need to know in order to gain the competence necessary to achieve real-world objectives at subsequent levels (p.261).

Writing activities within second/foreign language classes are broadly categorized into two types: those directly addressing learners' communicative goals in real-world contexts, and pedagogic tasks aimed at enhancing genre knowledge and compositional abilities.

Deaf problems in writing academic tasks

Writing requires advanced language skills, and deaf students may have difficulty expressing their thoughts and ideas clearly and coherently on paper, especially if they face barriers in understanding written language. According to Vizzi et al. (2023) deaf persons had a higher rate of all forms of text generation mistakes, most likely due to the nature of the picture naming task, in which stimuli are not chosen by participants and a precise comparison between groups is possible.

In terms of mistake categorization, deaf individuals had a higher incidence of semantic errors, word substitutions, and morphological errors, indicating a lack of lexical-sematic competence and a deficiency in grammar usage, also found that they even though regular words were written more precisely than ambiguous terms, the mistake analysis revealed a frequency of phonologically non plausible misspellings regardless of the kind of stimulus.

Herrera (2005) identifies several factors contributing to the low proficiency of Spanish in deaf students. Firstly, the structural differences between sign language and oral language pose a challenge. Limited linguistic exposure further compounds the issue. Additionally, these students receive minimal reading instruction, and face constraints in various linguistic competencies, including lexical, syntactic, semantic,

and discursive aspects. Consequently, their vocabulary remains limited, and they struggle with reading comprehension. Overall, the pattern of results is consistent with a less-than-skillful use of the phonological spelling technique and some support for the lexical-orthographic approach.

University of Worcester [UW] (2004) in the study found that this unique academic landscape has revealed that deaf learners encounter distinctive obstacles in mastering English, characterized by frequent grammatical errors in written expression and a tendency to omit crucial words. These challenges are intricately linked to the absence of auditory input and the subsequent impact on auditory memory, making note review a formidable task. Additionally, deaf students often grapple with a restricted vocabulary and a lower reading proficiency compared to their hearing peers. This discrepancy necessitates a continuous exploration of both specialized jargon and common language, as deaf learners diligently strive to comprehend and effectively communicate in the English language. Understanding and addressing these issues is paramount for creating an inclusive and supportive learning environment for deaf students at UW.

In the process of acquiring English syntactical and morphological structures, individuals with a hearing impairment often encounter a variety of errors, whether they are engaged in auditory or visual learning. These errors tend to manifest notably at the sentence level, posing challenges in the mastery of language intricacies. Moreover, the reading difficulties commonly experienced by many Deaf and Hard of Hearing (D/HH) students contribute to limitations in their exposure to proficient writing models. This dual challenge not only affects their language acquisition but also underscores the need for targeted interventions and diverse instructional approaches that cater to their unique learning needs (Antia.et.al, 2005).

Develop deaf people's enthusiasm for academic writing.

It is important to incorporate strategies to motivate deaf people to write in order to improve this particular skill. Deaf children Australia (2012) mentioned some strategies such as:

Writing together enhances the deaf 's vocabulary but also aids in developing visual skills and fostering reading comprehension.

Avoid pressuring the child to tackle overly challenging books or those they are uninterested in. Instead, subtly convey encouragement for academic writing, such as allowing them to stay up a bit later under the condition that they engage in writing.

Promote a joyful reading experience by sharing books together and engaging in discussions, comments, and questions about the experiment texts, books and articles.

Introduce a daily journaling practice where short passages about various experiences, anticipated events, or observations are written. The deaf child reads the entries and responds, with no emphasis on correcting spelling, punctuation, or grammar. This journal serves as a "communication book" fostering positive attitudes towards reading and writing.

Enhance communication by exchanging notes instead of verbal instructions, encouraging the child to write responses. Incorporate professional by reading a articles together and collaboratively creating a new version or alternate ending based on the article's theme. Involve the child in storytelling by letting them dictate a story while you transcribe or type it.

Ensure the accuracy of meaning by checking frequently with the child, encouraging them to read along as you write. If the child desires, they can illustrate their research's, them in a special folder for later shared reading experiences.

These activities collectively contribute to an inclusive and enriching literacy environment for deaf children.

Paraphrasing

The implementation of the paraphrasing strategy not only allows students to demonstrate their understanding of the material but also serves as a valuable tool for

cultivating critical thinking skills. Hans (2017) rephrasing and reinterpreting the content in their own words, students engage in a process that goes beyond mere repetition, fostering a deeper level of analysis and interpretation. This approach encourages students to delve into the nuances of the subject matter, promoting a more comprehensive and personalized connection with the material.

The significance of the paraphrasing strategy in enhancing students' writing skills cannot be overstated. As students actively engage with the content through paraphrasing, they refine their ability to articulate ideas coherently, structure arguments effectively, and communicate complex concepts with clarity. Therefore, integrating the paraphrasing strategy into the learning process emerges as a holistic and impactful method for fostering both comprehension and advanced writing proficiency among students.

This multifaceted approach to learning not only reinforces academic proficiency but also cultivates a transferable skill set that proves beneficial in various educational and professional contexts.

Paraphrasing guidelines

According to Oshima (1993), the process of crafting an effective paraphrase involves four key steps:

Comprehensive Reading: reading the text meticulously multiple times until a full comprehension is achieved. This initial step is crucial for gaining a deep understanding of the content before attempting to rephrase it.

Clarifying Unfamiliar Words: The authors suggest looking up any unfamiliar words, replacing them with synonyms to enhance clarity. This step promotes clarity and ensures that the paraphrased version maintains the intended meaning.

Creating a Structured Outline: Oshima and Hogue advocate for crafting a brief outline encompassing the main idea, supporting points, and primary and secondary details. This structured outline serves as a roadmap for the paraphrasing process, guiding the writer in preserving the essential components of the original text.

Paraphrasing with Care: The authors emphasize the use of different vocabulary and sentence structures in crafting the paraphrase, with a strict prohibition against omitting essential ideas or altering the original meaning. This step underscores the importance of maintaining fidelity to the source while expressing the ideas in a unique manner, showcasing a mastery of language and understanding.

Paraphrasing challenges

While paraphrasing serves as a valuable skill for conveying information with originality, it is not without its challenges, particularly for non-native English speakers. Thadphoothon (2019) highlights that paraphrasing written texts is considered one of the more intricate abilities for individuals who do not have English as their first language. The process involves not only comprehending the original material but also acquiring a sufficient level of linguistic competency to rephrase the content using one's own words while preserving its essence.

This complexity adds a layer of difficulty, making it a challenging task for students, especially those who are not native English speakers. Thadphoothon also notes that university students, much like their counterparts, often struggle to develop these high-level paraphrasing talents. This paper delves into the intricacies of paraphrasing, exploring the difficulties non-native English speakers face and shedding light on the challenges that students encounter, particularly at the university level, in honing this crucial skill.

Technology in Education

In the contemporary educational landscape, the integration of technology has become an imperative facet of learning in schools and classrooms. Recognized globally by educational systems, researchers, parents, governments, leaders, and teachers alike, technology is deemed indispensable for a child's education. This recognition extends to countries like Australia, where the profound impact of technological advances on information sharing, creation, utilization, and development within society has been acknowledged.

In context, it has been acknowledged that the skillful use of information and communication technologies (ICT) is crucial for the younger generation. The evolving nature of technology requires students to be highly adept at navigating and utilizing ICT. Recognizing this, educators, both seasoned and recently graduated, play pivotal roles in shaping the technological competencies of students.

Experienced teachers, having witnessed the evolution of educational technology, can seamlessly integrate their teaching methods with the innovations brought about by technology. Simultaneously, recently graduated teachers, being inherently familiar with the latest technological trends, bring a fresh perspective to the educational landscape. The collaboration between these two groups of teachers is not only beneficial but essential. The exchange of knowledge and skills can be harnessed for collaborative lesson planning, leveraging the strengths inherent in the teaching and learning processes of both groups (Ranasinghe & Leisher, 2009).

In essence, the symbiotic relationship between seasoned and recently graduated teachers becomes a cornerstone for creating dynamic and technology-rich learning environments that cater to the diverse needs of today's learners.

According to Prensky (2008), technology plays a crucial role in enhancing the teaching and learning process in various ways. It fosters greater enthusiasm among

learners, enriches communication skills, provides accessibility to students of all levels and capabilities, serves as an excellent research tool, facilitates effective assessment, and better prepares students for education. The field of computer science, in particular, is characterized by high expectations for positive outcomes, placing constant pressure on adaptation and evolution.

In the computer science program, teachers bear the responsibility of motivating students to explore diverse resources, research centers, and databases for informative applications. A crucial aspect of effective teaching in this domain is encouraging students to identify the skills, knowledge, and sources essential for their learning process. Lesson planning should incorporate a wide range of audio-visual aids, and teachers should actively guide students to self-determine the resources necessary for their academic journey.

Moreover, teachers must integrate sources and research skills seamlessly into lessons, emphasizing practical applications through labs, projects, and assignments. This integration is crucial for computer science students as it allows them to translate theoretical concepts into practical implementation. Practical skills acquired through such methods not only clarify theoretical concepts but also equip learners with the capabilities needed in the context of the present globalized world. In essence, the dynamic and evolving nature of computer science requires an adaptive and hands-on approach to teaching and learning.

Technology Integration in Teaching

As asserted by Roger (2004), the infusion of Information and Communication Technology (ICT) into educational institutions is a transformative endeavor aimed at enhancing the overall quality of learning experiences. It involves a journey through different physical mediums that serve as communication channels, reshaping the educational environment. Following Roger's diffusion model, the adoption of new technological developments unfolds through distinct stages.

Commencing this process is the awareness or knowledge phase, wherein ICT users make crucial decisions regarding the integration of technology. This initial stage acts as a catalyst, marking the commencement of the integration journey in education. It establishes the groundwork for subsequent stages in the diffusion process, underscoring the significance of understanding decision-making and awareness aspects for the effective implementation and integration of ICT in educational practices.

Online Learning Tools

Utilizing online learning tools in computer science education can have a profound impact on students, as highlighted. The study suggests that while different learning styles may not significantly influence how students communicate with their peers, teachers, or media, they do play a crucial role in shaping students' performance in areas such as class participation and group activities.

The versatility of online learning methods allows their application across diverse domains, making them valuable pedagogical tools (Musca et al., 2016). The convenience offered by these tools is a key aspect, enabling effective and flexible educational delivery. In the realm of computer science, where adaptability and hands-on experience are essential, online learning tools provide a platform for interactive and engaging learning experiences that cater to various learning styles. As technology continues to advance, leveraging online tools in education becomes increasingly integral for fostering effective communication, collaboration, and overall student performance.

Writing strategies adapted for students who are deaf learners

In the educational realm, addressing the specific needs of deaf students involves the implementation of tailored pedagogical strategies. In this context, various strategies are presented to optimize the learning process for students with hearing disabilities. These strategies, designed to foster the acquisition of language skills and promote a positive educational experience, encompass recognizing the value of the student's first

language and simultaneously developing literary and linguistic skills, (Brokop & Persall, 2009) mentioned some strategies:

Promote the Significance of First Language: Highlight the importance of the learner's first language, whether it is American Sign Language (ASL) or another signed language. This approach aims to cultivate motivation and foster a positive self-concept.

Monitor Linguistic Load: Recognize and manage the linguistic load that Deaf learners carry as they develop language proficiency. For instance, expecting learners to convey conceptual understanding in sign language and subsequently transcribe it into English can be a complex task. Offering support during the composition process acknowledges the cognitive demands involved.

Embrace a Bilingual Approach: Advocates of a bilingual approach assert that instructors should possess a foundational understanding of the learner's first language. This knowledge is crucial for interpreting miscues that reveal language processing challenges. Additionally, an awareness of the values embedded in Deaf culture enhances effective communication and instruction.

Simultaneous Development of Literacy and Language Skills: Acknowledge that language processes—listening, speaking, reading, and writing—can evolve concurrently. Rather than delaying literacy skills for the sake of focusing solely on listening and speaking skills, emphasize the simultaneous development of literacy skills and sign language communication for Deaf learners.

Facilitate Translation: Allow Deaf learners to engage in translation activities. Instructors with a basic knowledge of the learner's first language can assist in drawing comparisons between the two languages, facilitating a deeper understanding.

Prioritize Comprehension: Encourage Deaf learners to focus on comprehension, emphasizing meaning and contextual understanding. This approach underscores the significance of making sense of information within a given context, fostering effective language acquisition and communication skills.

Technological tools in writing skills

In the realm of education, the integration of technology has emerged as a powerful catalyst for fostering and refining writing skills, with particular implications for the advancement of deaf students. Recognizing the transformative potential, researchers such as Tahsaldar and Semaan (2018) emphasize the crucial role of technology in elevating creative writing capabilities. In this context, the amalgamation of technology into the teaching-learning process stands out as a key strategy to unlock new avenues for expression and communication.

Deaf students, in particular, stand to benefit significantly from these advancements, as technology not only serves as a tool for skill development but also acts as a bridge, enabling them to overcome communication barriers and flourish in the realm of written expression. This paper explores the profound impact of technology on enhancing writing skills, shedding light on its potential to revolutionize the educational landscape, especially for those with unique learning needs.

The omnipresence of technology in the educational landscape exerts a considerable influence on learning across various domains. In particular, its impact on the cultivation of learners' creative writing (CW) and language abilities is noteworthy. As underscored by Jiang et al. (2019), technology serves as a potent catalyst for positive transformations in the learning process. By providing a platform that facilitates engagement, communication, and connectivity among students and professors, technology becomes a conduit for fostering not only individual skill development but also collaborative endeavors. The integration of technological tools enables the seamless initiation of product development, collaborative projects, and joint learning experiences.

This paper delves into the multifaceted role of technology in shaping the educational landscape, shedding light on its capacity to empower learners in honing their creative writing skills and language proficiency through collaborative and interconnected learning environments.

Grammarly in Writing

The use of technology can have a significant impact on the development and improvement of writing skills, and this is especially relevant for deaf students. Modern word processors offer advanced style and grammar checking features. These tools can help deaf students improve their writing by providing suggestions on sentence structure, word choice, and grammar.

In the realm of English as a Foreign Language (EFL) writing classes, the evaluation and enhancement of language proficiency are crucial aspects. A noteworthy tool for this purpose is "Grammarly," an online grammar checker designed to scrutinize written work for a spectrum of linguistic intricacies. Widely recognized, Grammarly serves as a comprehensive proofreading tool, allowing users to meticulously assess and rectify errors pertaining to grammar, punctuation, vocabulary usage (including synonyms), and even plagiarism detection.

As elucidated by Ghufron and Rosyida (2018), Grammarly's functionality extends beyond mere error correction; it becomes a valuable companion in refining not just the mechanics but the overall linguistic precision of written content. This paper investigates the utility of Grammarly in the context of EFL writing classes, exploring its efficacy in elevating language proficiency and promoting accurate, polished expression among learners.

Use of QuillBot

QuillBot employs advanced Natural Language Processing (NLP) methods and deep learning algorithms to facilitate paraphrasing and writing assistance. The process can be outlined as follows:

Input Understanding: QuillBot analyzes user-provided text, breaking it down into individual words, establishing connections, and grasping the overall context through various NLP techniques.

Word and Phrase Replacement: Utilizing an extensive repository of linguistic patterns and synonyms, QuillBot generates alternative words and phrases. It prioritizes contextual and semantic similarity to maintain the original meaning.

Grammar and Syntax Adaptation: When paraphrasing, QuillBot meticulously attends to phrase construction and adheres to grammar conventions. It rearranges sentences and modifies word choices to ensure grammatical accuracy and coherence.

Contextual Understanding: Striving for a comprehensive grasp of context, QuillBot considers words, sentence structure, and overall content meaning. This contextual understanding enhances the accuracy and relevance of the paraphrased output.

Feedback and Iteration: Continuous learning is integral to QuillBot's functionality. User feedback serves as a valuable resource for system improvement. The QuillBot team utilizes feedback to address any identified errors or inconsistencies.

Paraphraser: QuillBot excels in complex paraphrasing, allowing users to input phrases, paragraphs, or entire texts. The tool provides alternative wording while preserving the original meaning. Users benefit from discovering new ways to express ideas, avoiding plagiarism, and enhancing clarity in their writing.

It's crucial to acknowledge that while QuillBot's algorithms are optimized through extensive data training, users should evaluate the paraphrased text and make necessary adjustments to align with their specific requirements. As with any AI-based technology, perfection in results is not guaranteed (QuillBot, 2022).

Functions of technological tools Grammarly and QuillBot for writing tasks.

In the realm of writing assistance, two notable technological tools, Grammarly and QuillBot, stand out for their contributions to refining written content. Grammarly, an internet-based correction tool, plays a pivotal role in checking texts for grammar errors. Widely recognized for its effectiveness, Grammarly, as highlighted by Karyuatry (2018), offers users a valuable resource for enhancing the grammatical accuracy of their writing. On a parallel note, QuillBot, another technological tool, specializes in online writing tasks, particularly in the realm of grammar correction.

These tools collectively represent a technological frontier in aiding writers by not only identifying and rectifying grammatical errors but also by providing a nuanced approach to language refinement. This paper delves into the distinctive features and applications of Grammarly and QuillBot, examining their efficacy in improving the quality and precision of written works, with a specific focus on grammar correction. Perdana et al. (2021) mentioned that:

> Grammarly works very fast by automatically providing corrections. Its automaticity is also much helped according to the author's internet connection speed. So, this is different from most of us who work in the professional sector using such as grammar for business which also offers various practices so that writers are speedy and make writing products look outstanding (p. 123).

But is so necessary mention the advantages that this type or technological tools have over of the writing tasks.

This tool is designed to help users rephrase or rewrite sentences and paragraphs while maintaining the original meaning. It is useful for those who wish to avoid plagiarism

when rephrasing content or for those who seek to express ideas in a different way. Nurmayanti & Suryadi, (2023) stablished that:

> One of QuillBot's seven useful features is called Standard Mode, and its purpose is to make your input text look and sound as natural as possible, while preserving the meaning of what you type. Fluency Mode, which emphasizes the use of proper English grammar and a more natural font style. With this function, the text is only slightly modified, but the intended meaning is preserved. Three, a "Creativity Mode" that emphasizes making as many alterations as possible to the entered text. However, this may change the meaning or overall consistency of the results. If you want your text to look drastically different from the source text, this mode is for you. Fourth, the Creative+ Mode, which modifies the text in a more intuitive and grammatically deeper way, for example with common phrases or sayings; fifth, the Formal Mode, which modifies the text to make it sound more appropriate for a formal audience (p.34).

As such, these modes offer users flexibility to adapt the output to their specific needs, whether it is naturalness, fluidity, creativity, formality or a combination of these elements, users can choose the mode that best suits the desired result for the modified text. Assistive technologies can facilitate feedback and assessment processes by providing written feedback, allowing for multiple modes of assessment, and ensuring that evaluation methods are inclusive and accessible for deaf students.

7. METHODOLOGY

Research approach

The approach of this study was qualitative, with a focus on the descriptive method. It focuses on understanding the individual human experience within its specific context and allows for flexible research processes that are inductive and dynamic while ensuring that the data collected remains true to the phenomenon under investigation without distorting its essence (Richie et al., 2013). In addition, this approach allowed the researcher to explore and understand the participant's opinions, experiences, and attitudes toward the use of Grammarly and QuillBot tools in writing tasks.

Research Context

The research takes place at the Technical University of Cotopaxi Pujilí, where the study was conducted with a single participant who has a hearing impairment. The participant is volunteered to participate in the research.

The voluntary participant plays a vital role in this research, as their perspective and personal experience regarding the use of the two technological tools under study provided valuable insights into the field of inclusive education. In addition, the participation of the sign language interpreter was important to achieve correct communication with the hearing-impaired student. It is important to note that informed consent was obtained from the participants, ensuring their full awareness and understanding of the research objectives, as well as their willingness to share their opinions and experiences related to the use of these technological tools (see Annex 1 and 2), and it was important to use codes for identify the opinions of participants, the codes were the following: for the deaf student [DS] and for the deaf student's interpreter [DSI].

Data collection procedure

 The data collection procedure involved obtaining informed consent from both the deaf student and the sign language interpreter (see Annex 1 and 2). An interview conducted by the researcher served as the instrument to gather the opinions and perspectives of the deaf English learner. The structured interview was facilitated with the assistance of the sign language interpreter (see appendix 1 and 2). This interview occurred in two phases during the research process.

During the initial phase, the researcher elicited comments from the hearing-impaired student regarding the challenges encountered when completing written tasks. This phase provided an overview of the participant's academic needs. Subsequently, based on the analysis of these results, strategies for utilizing Grammarly and QuillBot tools

were shared with the participant to enhance her future written tasks. Once the researcher confirmed, with the assistance of the interpreter, that the participant understood the usage of these technological tools, an analysis of two written tasks was conducted, involving paraphrasing related to the subject being studied.

The selection of written tasks for analysis involved consultation with a professor experienced in teaching deaf learners. The professor provided two paraphrasing tasks—one completed before the participant utilized the tools and another completed afterward. These tasks were evaluated using a rubric that considered the same criteria for both pre- and post-task assessments (refer to Annexes 3 and 4).

Furthermore, a separate rubric was employed to evaluate the participant's paraphrasing and writing skills in the two different tasks (see appendix 3). The first task examined the participant's performance without using the technological tools, while the second task assessed the participant's application of the tools. The rubric facilitated a comprehensive assessment of the participant's competence in both situations (see appendix 4 and 5), and finally established a comparison between the two tasks using a comparative table (see appendix 6). In this way, it was possible to verify differences between the written tasks before and after the application of the tools. All the results are presented in the corresponding section.

Data analysis

The data analysis that was used in the research was thematic analysis, since according to Braun & Clarke (2012) "Thematic Analysis allows the researcher to see and make sense of collective or shared meanings and experiences" (p.6). Thematic analysis was employed to analyze the data and address the research questions related to the use of Grammarly and QuillBot as support in academic writing tasks for a deaf student. In this analysis, the steps suggested by Braun and Clarke (2012) were followed. The first step consisted of transcribing the interviews conducted with the deaf student and the interpreter. Then, the data was classified by colors (See annex 5 and 6), and the themes

were defined in order to analyze them in depth, and based on this, achieve the research objectives' answers (see appendix 7) .

8. ANALYSIS AND DISCUSSION OF RESULTS

Results

This section is presented in terms of the achievement of the specific objectives proposed in the research.

Results analysis for the Second Specific Objective

To answer the second specific objective, which is based on the problems the student had in creating written assignments, once the interview data were analyzed, the results obtained permitted to identify theme called Challenges in writing skills, with is corresponding subcategories: a) Words meaning b) English Language understanding c) Word order

Theme 1: **Challenges in writing skills.**

a) **Subcategory:** *Words meaning*

"(….) hay palabras que no conozco el significado"- [There are words that I don't know the meaning] (DS)

"no conozco el significado de algunas palabras"-[I do not know the meaning of some words] (DS)

"tiene un vocabulario limitado, no conoce el significado de algunas palabras." [She has a limited vocabulary; she does not know the meaning of some words.] -(DSI)

The responses indicate that participants have difficulty understanding the meaning of some words. This suggests a limitation in their vocabulary and may affect their

ability to express themselves clearly in writing. The lack of understanding of word meanings can be a significant obstacle to improving writing skills. It is essential for students to grasp the meaning of words in order to use them appropriately in written contexts. This difficulty may be particularly challenging for deaf students, as they may face additional barriers in vocabulary acquisition due to their hearing impairment. These findings are consistent with Ludlow et al. (2019) the observation of the importance of technological tools in improving vocabulary and understanding word meanings in deaf students with writing difficulties. Limitations in vocabulary and difficulty understanding word meanings can be effectively addressed through the use of technological tools that offer word search and synonym functions. This underscores the importance of integrating technology into teaching to support vocabulary development and improve writing skills in deaf students.

b) Subcategory: English language understanding

"(..)no puedo entender muy bien en inglés." ["(..)I can't understand very well in English."](DS)

"escribir en inglés es difícil."["writing in English is difficult."](DS)

"en inglés es difícil escribir, no entiendo muy bien" ["in English it is difficult to write I don't understand very well."](DS)

The responses indicate that participants struggle with understanding and writing in English, due to their limited proficiency in the English language, which can hinder their writing abilities. Difficulty in understanding and writing in English is a common obstacle for many students, especially for those whose first language is not English. For deaf students, this challenge may be amplified due to potential limitations in exposure to spoken English and linguistic nuances. Without a strong grasp of English language skills, it can be difficult for deaf students to effectively express themselves in writing. These responses align with the observations made by Mishra et al. (2010) regarding the use of information and communication technologies to overcome learning barriers, including difficulties in language comprehension. The author emphasizes the importance of adapting teaching

materials to address the needs of students with disabilities, including deaf students who may require additional support in developing English language skills. The integration of technological tools that offer language learning support could be beneficial in addressing this challenge and enhancing the writing skills of deaf students.

c) **Subcategory:** *Word order (sentence structure)*

"algunas oraciones suelo confundirme"- ["some sentences tend to confuse me"] (DS)

"en la estructura suelo confundirme también, no es igual que escribir en español"- ["in the structure I tend to get confused too, it's not the same as writing in Spanish".](DS)

"tiene mucha dificultad al ordenar palabras"-["have a lot of difficulty ordering words"] (DSI)

"Muy difícil la estructura de las oraciones"- ["Very difficult sentence structure"](DS)

"Tiene dificultades, en oraciones, textos escritos y sobre todo en la parte gramatical"- ["Has difficulties, in sentences, written texts and especially in the grammatical part"](DSI)

The participants' responses indicate significant difficulties related to sentence structure and word order in writing. This type of obstacle hinders their ability to understand and apply English grammatical rules correctly. Difficulty with sentence structure and word order may be attributed to various reasons, including differences between English and Spanish, as well as general challenges in acquiring English as a second language. For deaf students, who may already face challenges in language learning due to their hearing impairment, understanding and applying grammatical rules can be especially difficult. The participants'

responses underscore the importance of addressing the specific challenges that deaf students face in writing, particularly regarding sentence structure and word order. These challenges are consistent with observations from previous research, such as those of Mishra et al. (2010), which highlight the need to implement educational approaches that integrate technological tools to improve understanding and practice of sentence structure, and word order, and assist deaf students in developing solid grammatical skills. Additionally, it is essential to provide additional support and individualized instruction to ensure that deaf students can overcome these barriers and reach their full potential in writing in English.

To answer the third specific objective, which is related to determining the perceptions of a deaf learner after the use of Grammarly and QuillBot for writing academic tasks, once the interview dates were analyzed, the results obtained produced a theme named Technological Tools, and it was possible to get three subcategories: usage a) challenges using technological tools; b) Effective correction by Grammarly c) Paraphrasing effectiveness by QuillBot; d) Confidence in improving writing skills.

Theme 2: Technological tools usage

a) Subcategory : Challenges using technological tools

"no conocía estas herramientas." ["I didn't know about these tools."]DS

"No conocía estas herramientas fue un poco difícil de entender su uso"- ["I didn't know about these tools it was a little difficult to understand how to use them."] (*DS)*

"son herramientas nuevas para mi también, no conocía estas herramientas y su uso"- ["for me they are also new tools, I didn't know these tools or their use".] (DSI)

"fue un poco complicado como te dije no tenía conocimiento de estas herramientas."-["It was a bit complicated as I told you I had no knowledge of these tools."](DSI)

Based on the responses provided by the participants regarding the challenges in using technological tools, it can be observed that some of them expressed that they were not familiar with these tools and found it difficult to understand how to use them. These responses suggest that the lack of prior knowledge about technological tools presented a significant obstacle for the participants when trying to use them. These responses highlight the importance of providing adequate training and guidance to students when introducing new technological tools in the learning process. Baglama et al. (2018) research supports the idea that using technology tools can have positive effects on writing skills development, but it's crucial to ensure users get the necessary guidance to maximize their usefulness. Therefore, educators are advised to provide additional resources and support to help students overcome initial challenges and make the most of these tools' potential.

b) Subcategory: Grammarly use

"Si, muy útil, me ayuda mucho en mis tareas, me ayuda a escribir mejor Grammarly"- [Yes, very useful, it helps me a lot in my homework, it helps me to write better Grammarly](DS).

"me corrigió la escritura de palabras, también la escritura de oraciones, me señalo que debo corregir." - ["that corrected me on the writing of words, also the writing of sentences, it pointed out to me that I should correct."] (DS)

"Grammarly también me ayuda con escritura correcta de estructura de oraciones y palabras."-[Grammarly also helps me with correct writing of sentence structure and word structure.](DS)

"Grammarly le ayudó a ordenar sus ideas pudo visualizar más lo que parte gramatical"- [Grammarly helped her to sort out his ideas and she was able to visualize more of the grammatical part]*(DSI).*

The participant states that the use of Grammarly helpful and beneficial for improving their writing skills, the participant perceive Grammarly as an effective tool for correcting grammatical errors, enhancing sentence structure, and expanding their vocabulary. In addition, the interpreter stated that the tool helped her visualize grammatical structures, which can lead to increased confidence in using the tool, avoiding many spelling errors. These findings are consistent with previous research, such as that conducted by Fitria (2021), which demonstrated positive outcomes when using similar tools to Grammarly with university students. Additionally, the research by Baglama et al. (2018) supports the notion that the use of technological tools, like Grammarly, can have a positive impact on developing writing skills in individuals with hearing impairments. Therefore, participants' positive perception of Grammarly aligns with existing evidence and suggests that this tool could be valuable in supporting the writing process for deaf learners.

c) Subcategory: QuillBot use

"QuillBot fue muy útil para hacer una tarea de parafraseo de varios textos."-[*"QuillBot was very helpful in doing a paraphrasing assignment of various texts."] (DS)

"QuillBot es fácil buscar los sinónimos y sentido a frases"-["QuillBot is easy to search for synonyms and meaning in sentences"](DS).

"QuillBot los sinónimos, y a la vez que le ayudaba a entender los párrafos que ella parafraseaba."- ["QuillBot the synonyms, and at the same time helping her to understand the paragraphs she paraphrased."](DSI)

The responses indicate that participants find QuillBot useful for improving paraphrasing and text comprehension skills. This positive perception suggests that QuillBot provides them with an effective tool for addressing writing tasks involving content rephrasing. Additionally, the fact that the deaf participant and the sign language interpreter highlight the ease of searching for synonyms and the meaning of sentences with QuillBot suggests that the tool may be intuitive and user-friendly, enhancing its utility for students struggling with the writing process. These findings are consistent with previous research by Fitria (2021), which also demonstrated positive results when using similar tools to QuillBot with university students. Moreover, QuillBot's ability to provide synonyms and aid in text comprehension may be particularly beneficial for deaf students, who may face additional challenges in understanding written content. Taken together, these responses suggest that QuillBot can be a valuable tool for supporting the writing process of students, offering an effective and accessible way to improve paraphrasing and text comprehension.

d) Subcategory: Confidence in improving writing skills

"Si, las dos herramientas me ayudarán a mejorar en la escritura, y a escribir mejor en muchas tareas que me envíen los profesores."- ["Yes, the two tools will help me get better at writing, and write better on many assignments that teachers send me."](DS)

"Estas herramientas son buenas pues le ayuda a encontrar más sentido a lo que los estudiantes quieren escribir."- ["These tools are good as it helps you make more sense of what students want to write about."] (DSI)

"(...)van a entender el proceso al buscar palabras o sinónimos a las palabras y saber cómo se realiza un parafraseo."- ["(...)they are going to understand the process by looking up words or synonyms to words and knowing how paraphrasing is done."] (DSI)

"(......)a ella le va a ayudar cómo lo dije no sólo a copiar una definición, sino también a darse cuenta que hay otro tipo de palabras, y le ayuda a crecer su

vocabulario, a mejorar la gramática, y en el caso de cuando ella tenga una investigación, pues la utilizará"- ["(......)it will help her, as I said, not only to copy a definition, but also to realize that there are other types of words, and it will help her to grow her vocabulary, to improve her grammar, and in the case of when she has a research, she will use it."] (DSI)

Participants' responses highlight the usefulness of tools such as Grammarly and QuillBot in improving writing skills, especially for students with linguistic difficulties such as the deaf. Also, participants express confidence that these tools will improve their writing skills. These responses suggest that technological tools can play a crucial role in improving language skills, especially for students with specific difficulties, such as the deaf. This reflects a positive trend towards the integration of technology into the learning process, which is supported by previous research by Ludlow et al. (2019) and Fitria (2021), who found notable improvements in students' writing skills when using similar tools.

Furthermore, the responses highlight the importance of these tools in expanding vocabulary, improving grammar, and facilitating text comprehension. This observation aligns with the conclusion of Baglama et al. (2018), who found positive effects on sentence construction and the correct use of verb tenses when employing similar technologies. Therefore, it is clear that tools like Grammarly and QuillBot can be valuable resources for students with language difficulties by providing immediate and specific support during the writing process.

To answer the fourth objective concerned to examine the effect of the use of Grammarly and QuillBot in a deaf learner's writing task, two task were analyzed one before the use of the tools and the other after the use of them, these two tasks had the guidance of the teacher tutor of a subject the learner was studying, and it was used a paraphrasing rubric to correct the tasks. (See annex 4).

Table 2 shows the results obtained before the application of the QuillBot and Grammarly technological tools.

Table 2

Paraphrasing rubric prior to the use of technology tools-Task to paraphrase a text.

Assessment criterio	Description	Yes	No
Synonyms	Use synonyms (keep the same word if it is a special terminology)		no
Meaning	Keep the same meaning of the original	yes	
Information	Do not add any extra information or leave out information	yes	
Structure	Change the order of words or sentence structure.		no
Citation	Include the citation of the source where you take the ideas (If this is for research purposes)	yes	
Text length	Keep the same length as the original	yes	

Once the task was done and the rubric was applied, the first results suggest that in the paraphrasing task the deaf student did not paraphrase, so she only copied and quoted the text. Regarding the use of synonyms, she did not use it to perform the paraphrasing, so the original text was not modified, i.e., kept the same meaning and the same length of the text. It could occur because paraphrasing was difficult so she did not do it, and did not try to change the structure of the sentences.

After an arduous explanation regarding the use of these two tools, and how each of them is used, the results presented in Table 2 were obtained, after the participant applied the technological tools in a similar task.

Table 3

Paraphrasing rubric after the use of technological tools- Task to paraphrase a text

Assessment criteria	Description	Yes	No
Synonyms	Use synonyms (keep the same word if it is a special terminology)	yes	
Meaning	Keep the same meaning of the original	yes	
Information	Do not add any extra information or leave out information	yes	
Structure	Change the order of words or sentence structure.	yes	
Citation	Include the citation of the source where you take the ideas (If this is for research purposes)	yes	
Text length	Keep the same length as the original	yes	

According to the results of the rubric, the results were positive with respect to the paraphrasing task provided by the subject teacher. It can be evidenced that the technological tools provided assistance for the student to use synonyms, change sentence structures, so that the written paraphrasing task fulfilled the requirements of the rubric.

Finally, a comparison of the results before and after the use of the technological tools was made as shown in Table 4.

Table 4

Comparative chart before and after the use of technological tools

	Before the use of technological tools		After the use of technological tools	
Assessment criterio	**Yes**	**No**	**Yes**	**no**
Use Synonyms		No	Yes	
Keep the meaning	Yes		Yes	
Keep the informatio n	Yes		Yes	
Structure of sentences		No	Yes	
Citation	Yes		Yes	
Text length	Yes		Yes	

9. Research impacts (technical, social, environmental, education or economic)

This research study has not only contributed to the educational sector but has also left a significant impact on various fronts, including technical, social, and educational aspects.

From an educational perspective, the study delves deep into the challenges faced by hearing-impaired students, particularly in the realm of writing skills. By exploring the literature, we not only bring attention to prevalent issues in writing and English language learning within university settings but also emphasize the crucial role of technological tools in effectively addressing these challenges. Specific writing hurdles, such as difficulties with word meanings, limited vocabulary, and grammar intricacies unique to deaf students, are underscored.

The study advocates for the thoughtful adaptation and application of technology to provide tailored solutions for these writing challenges. This adaptation is deemed essential not only to bolster the development of effective writing skills but also to facilitate the seamless integration of hearing-impaired students into academic society and beyond. Beyond the educational sphere, the implications of this research extend to the technical domain, emphasizing the need for innovative solutions, and to the social realm, promoting inclusivity and understanding. The comprehensive impact of this research resonates not only within educational circles but also within broader societal contexts.

10.- CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In conclusion, the in-depth exploration of topics and concepts related to deaf students and their English writing skills has unveiled a complex intersection of factors influencing this educational process. From the importance of inclusive education to the relevance of assistive technology, this analysis provides a comprehensive insight into the challenges and opportunities faced by deaf students in developing their writing skills in an English-centric environment. The implications of these findings pave the way for new educational strategies aimed at significantly enhancing access and success for deaf students in the development of their English writing skills, thereby promoting a more inclusive and equitable education.

The analysis of challenges that was obtained through the interview of deaf learner about the writing skills has revealed significant obstacles, primarily focusing on aspects related to the meaning of words. The deaf student faces considerable difficulties in understanding the meaning of certain words in English, as the language is inherently challenging for her. Her limited vocabulary, characterized by its simplicity, also poses an evident challenge. Additionally, concerning sentence structures, the student experiences difficulties in effectively reconfiguring them. It is crucial to note that both the deaf student and the interpreter highlighted issues related to language comprehension, emphasizing her limited vocabulary and the specific challenges she faces in sentence structure. These observations reinforce the urgent need to tailor interventions and linguistic support specifically, recognizing and addressing the particular barriers that deaf students encounter in their academic development.

Through the interview application, it was determined that the perceptions of the deaf student after using both technological tools in an academic paraphrasing task were positive. Additionally, she emphasized the utility of Grammarly and QuillBot. Through the constant use of these technological tools, deaf student can improve and overcome the challenges they face in writing tasks. This suggests that the integration of Grammarly and QuillBot can effectively enhance the academic writing experience of deaf student by providing efficient and effective tools.

The analysis of the impact of using Grammarly and QuillBot on a deaf student's writing task revealed significant improvements in the paraphrasing task provided by the teacher. Before the application of these tools, the assignments lacked paraphrasing and the use of synonyms, as indicated by the rubric. However, after implementing Grammarly and QuillBot, it was observed that these two technological tools functioned as automatic assistants to provide suggestions within written tasks. This clear difference between the pre-application and post-application phases, showing marked improvements, emphasizes the effectiveness of these assistive technologies in addressing challenges that may arise in such tasks, thus enhancing the presentation of the assignment.

Recommendations

Based on the university context, the bibliographic review shows that it is recommended develop accessible learning resources that respond to the language needs of hearing-impaired learners. This could involve providing captioned learning materials, visual aids and multimedia resources to supplement traditional learning materials and ensuring that course materials are designed with accessibility in mind, fostering a more inclusive and supportive learning environment.

In addressing the challenges associated with writing skills, a key recommendation is to implement specialized writing workshops. These workshops should be tailored to provide personalized attention, especially for students with hearing impairments. Such targeted interventions can effectively address specific challenges encountered by these students, such as limited vocabulary and difficulties in paraphrasing. Incorporating elements of personalization ensures that the writing workshops are finely tuned to the individual needs of each student, fostering a supportive learning environment that enhances their writing proficiency.

According to the use of Technological tools, it is recommended to promote the use of assistive technologies, such as Grammarly and QuillBot, to help the deaf student overcome difficulties related to written language and provide training sessions to familiarize students with these tools and integrate them into writing tasks emphasizing the vocabulary, synonyms, paraphrasing and sentence construction to address writing challenges.

In relation of the Grammarly and QuillBot, it is recommended to ensure that the assistive technologies used, including Grammarly and QuillBot, are fully accessible and compatible with the diverse needs of the deaf student and to provide technical support to students and instructors to ensure seamless integration into the academic writing process.

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