A Meta-Analysis of Research on Using the QuillBot Application in English Language Learning

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Abstract

This study aims to review the general trends and research focus on the use of the **QuillBot** application in English language learning. The study examines language skills and areas, research instruments, publication types, study designs, text lengths, participants, participants' gender, the effectiveness of QuillBot, and publication years. A **meta-analysis** research design was employed to collect and analyze data. The study sample included 50 published studies between 2016 and 2024, comprising journal articles, theses/dissertations, and conference proceedings. The research instrument was a meta-analysis checklist, and descriptive statistics, including frequencies and percentages, were used to identify differences among the various features.

The findings indicated that the writing skill was the most frequently addressed in studies using QuillBot, while **questionnaires** were the most commonly used research instrument. Journal articles had the highest publication frequency, followed by theses/dissertations, and conference proceedings had the lowest. Qualitative research designs were the most prevalent, and texts ranging from 11–20 pages (5001–10000 words) were most common. Undergraduate students were the most frequently studied participants, whereas graduates were less studied. Groups with "15 or more" participants were the most frequent. Studies that did not specify participants' gender were the most common. QuillBot was found to be more effective than traditional methods, and that the period 2021–2024 witnessed the highest number of publications. Additionally, the paraphraser function was the most frequently used activity within the QuillBot application.

Key words: Meta Analysis Study, QuillBot Application, English Language Learning.

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دراسة ما بعد التحليلية للبحوث حول استخدام تطبيق QuillBot في تعلم اللغة الإنجليزية

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الملخص

تهدف هذه الدراسة إلى استعراض الاتجاهات العامّة والأهداف البحثية المتعلقة باستخدام تطبيق QuillBot في تعلم اللغة الإنجليزية. وتتناول الدراسة المهارات والمجالات اللغوية، أدوات البحث، نوع المنشورات، تصميم الدراسة، طول النصوص، المشاركين، جنس المشاركين، فعالية التطبيق، وسنوات النشر. اعتمدت الدراسة على تصميم **تحليل تلوي (Meta–Analysis)** لجمع وتحليل البيانات، وشملت عينة مكونة من ٥٠ دراسة منشورة بين عامي ٢٠١٦ و٢٠٢٤، بما في ذلك مقالات المجلات، أطروحات /رسائل علمية، ومؤتمرات علمية. كان أداة الدراسة عبارة عن قائمة مراجعة للتحليل التلوي، واستخدمت الإحصاءات الوصفية بما في ذلك التكرارات والنسب المئوية لدراسة الفروق بين الخصائص المختلفة. أظهرت النتائج أن مهارة الكتابة كانت الأكثر تناولاً في الدراسات البحثية باستخدام تطبيق QuillBot، بينما كانت **الاستبانة** الأداة الأكثر استخداماً. واحتلت مقالات المجلات المرتبة الأولى من حيث عدد المنشورات، تلتها الأطروحات /الرسائل العلمية، فيما كانت مؤتمرات العلوم الأدنى. وكان التصميم النوعي أكثر شيوعاً، بينما كان طول النصوص الأكثر استخداماً بين ١١–٢٠ صفحة (٥٠٠١–١٠٠٠٠ كلمة). وسجل طلاب المرحلة الجامعية أقلية البحث الأعلى مقارنة بالدراسات على الخريجين، كما كانت فئة المشاركين "١٥ وما فوق" هي الأكثر تكراراً. أما بالنسبة للجنس، فقد كانت الدراسات التي لم تحدد الجنس الأكثر انتشاراً. وأظهرت النتائج أن تطبيق QuillBot أكثر فعالية مقارنة بالطرق التقليدية، وأن الفترة ٢٠٢١–٢٠٢٤ شهدت أعلى معدل نشر. وكانت وظيفة **إعادة الصياغة (Paraphraser)** هي الأكثر استخداماً في أنشطة التطبيق.

الكلمات المفتاحيّة: دراسة ما بعد التحليلية، تطبيق **QuillBot**، تعلم اللغة الإنجليزية.

Introduction

Technology has advanced quickly over the last fifty years and influenced almost every aspect of life, including business and education. Its huge effect has been crucial to the development of international relations and the progress of humanity, promoting links between people from all over the world, according to Collins and Halverson (2010).

Recent findings indicate that learning has become more dependent on the usage of contemporary technologies. They report that it is more engaging and communicative. The dissemination of information is aided by modern technologies. When students use contemporary technology, their minds function more quickly. It produces advantages: Enhancing education while expanding worldwide, circumventing regional boundaries. Positive side effects are also present: Students become animated and enthusiastic about it, and it facilitates time management (Raja, 2018).

Technology is used in most language classrooms in one form or another. The use of technology has improved and benefited language learning. Teachers can increase language acquisition by modifying classes with the use of technology. Teachers generally find that technology is a useful tool for helping their pupils learn languages (O'Toole, 2019).

To enhance language quality and clarity, a variety of AI technologies assist language-related activities. The system offers personalised instruction by responding to questions and providing clarifications, automating feedback for errors and timely responses, and personalised learning experiences by supplying content based on user requirements. Collective intelligence, computer vision, common sense, data analysis, and emotional intelligence are some of the subcategories that make up the vast technical advancement of artificial intelligence. The theory of gaming, processing of images, natural language processing, neural networks, pattern recognition, and robotics are among the topics discussed (2020, Chong).

Technology has transformed the way humans think, learn, and complete activities. Regular ICT tools like projectors, digital whiteboards, and digital textbooks can be improved by interactive educational technologies including games, robotics, virtual reality (VR), computer simulations, block-based computing, and internet-related tools (Weng & Chiu, 2023).

The significant integration of technology into people's lives during the past century has contributed to an unforgettable period of invention and linear advancement. Human existence has been greatly impacted by this transformative integration, as technology tools are currently employed in many aspects of daily life. Mobile phones are widely used in modern culture for a variety of reasons, whereas traditional home telephones were once the standard. Due to the development of advanced technologies, mobile phones have almost completely replaced traditional home phones. The rapid and significant changes that humanity has experienced in a very short period have also had a lasting effect on human attitudes and behaviours. AI has enormous potential in the field of education since it can help teachers and provide students with personalised advice, support, and feedback.

AI systems apply machine learning to perform certain tasks, such as giving students feedback on their written work, translating written material, giving automated assessments, or using chatbots to facilitate structured conversation practice. In machine learning, large amounts of training data are analysed using statistical techniques to identify a specific trend, produce a model (usually in the form of strategies), and then act on the model (Hockly, 2023). The environments for instruction in computer-assisted language learning (CALL) have been specially designed to enhance the educational experiences of students with different language backgrounds and learning goals.

Since English is their first language, most native English speakers suffer with it. Students learning English as a second, foreign, or additional language surely have an even greater challenge. This is especially true for graduate students learning English as a foreign language (EFL) from non-Anglicized language or cultural backgrounds, this is especially true for Asian graduate students (Al Fadda, 2012). A lot of people believe that learning English is hard, especially EFL students (Sulaiman & Muhajir, 2019).

Considering that English is as international language, it is essential for communication on a global scale. English has become the most widely spoken language in the world during the Fourth Industrial Revolution and the Fifth Generation Society. Students suffer to learn and comprehend English since they are still in what is known as the "golden era" of their development. Researchers have

found that traditional teaching methods are outdated and Ineffective, in addition to finding that young people are not very interested in learning English. [To] "Inspire, grow, and support the will and creativity of learners as they participate in the learning process" is the stated goal of education (Amelia et al., 2021).

Mammadova (2019) ascertained that an AI-powered web-based application known as QuillBot may assist students with writing assessment processes like summarizing, citation generation, grammar and plagiarism checks, translation, and paraphrasing. All of these tasks are carried out automatically using an online system. QuillBot comes in two versions: the free version and the premium version. Another version is used to replace tool for students to use to improve their English writing is QuillBot.

QuillBot is generally one of the best free paraphrasing tools known. One of QuillBot's supplies provides suggests paraphrases utilizing AI (Dale, 2020). The AI strategy includes deep learning with certain techniques for natural language processing, explains Fitria (2021). For developing a new sentence, it automatically removes, updates, or changes words. Teachers and students who want the motivation to paraphrase their writing manually can find a solution in QuillBot, which assists with the paraphrasing process (Kusuma, 2020). This is a simple tool to use. QuillBot rewrites texts after we write or paste them and click the "Paraphrase" button (Kinga & Gupta, 2021).

A common, user-friendly, and cost-free machine-learning tool for paraphrasing is QuillBot. According to Fitria (2021), the AI methodology combines certain methods for natural language analysis with deep learning. Its automated function includes obtaining, adding, or changing words to create a newly paraphrased sentence, offering feedback, and producing an AI-based product that makes paraphrased suggestions. When QuillBot's paraphrase feature is activated, the application begins rewriting the supplied text.

Considering feedback has a major impact on both students' learning and teachers' teaching habits and practices, its essential role in education is widely appreciated (Winstone & Carless, 2019). Teachers have often been faced with a great deal of pressure from the major influence of their feedback in the classroom, especially in large classes and when it comes to assessment. In the absence of

feedback, teachers' assessment procedures are frequently seen as being more involved with "testing" than "assessment" (Wang et al., 2023).

According to Kurniati and Fithriani (2022), one of the most commonly utilized AI paraphrase tools is QuillBot. Anil Jason founded QuillBot in 2017. This application aim is to modify the text while preserving the primary composition's content by changing the sentence structure and replacing words with temporary partners. Other functions offered by the QuillBot application include a plagiarism checker, grammar checker, summarizer, translator, AI detector, co-writer, and citation generator.

According to Ayaz and Shekerci (2015), the concept of meta analysis the statistical analysis of a large set of data from one research effort to analyse the results from various studies has been known since According to Boulton and Tom (2017), Glass utilized the term to describe his study on teaching and psychotherapy at the University of Arizona. , meta-analysis is a systematic quantitative statistical technique used to organize, expand, and extract information from a lot of data gathered through various research studies.

According to Borenstein and Higgins (2013), gathering information from various researches is referred to as meta analysis. Meta analyses utilise the same statistical methods as primary research; however, the unit of analysis is the study itself rather than the topic. In contexts where the mean effect across all subjects is obtained from a single study, the meta analysis will present the (balanced) mean effect over all individuals. There are several subgroups in meta analysis. The mean effect can be determined for both studies utilising one version of the intervention and studies that use a different variation of the intervention. Following that, researchers are able to examine more than one mean effect.

The QuillBot Application and English Language Learning

Learning English is the method by which non-native speakers improve or gain proficiency in the language. The four fundamental English language skills of speaking, writing, listening, and reading in English are included in this (Driscoll, 2005). According to the researcher, the term English language learning refers to a teaching methodology, or more specifically, a set of instructional techniques that

help someone whose first language may not be English acquire the language's listening, speaking, reading, and writing skills. The goal of this study is to investigate how English is learnt in two distinct contexts: the formal, classroom setting and the more casual, non-instructional settings.

English is a vital language in the modern world, playing a key role in facilitating communication between different cultures. English is a common medium of interaction in many areas such as business, technology, and tourism, making it essential to interact effectively with individuals from diverse cultural backgrounds (Crystal, 2003). Knowledge of English opens the doors to higher education for individuals, as many international educational institutions offer study programs in English, enhancing opportunities for academic and professional advancement (Graddol, 2006).

In addition, English language contributes to providing access to a vast amount of information, as the internet is a major source of academic and scientific content that is more widely available in English (Peters, 2010). Learning English also enhances the development of personal skills and intellectual abilities, such as critical thinking and creativity, as it allows learners to express their ideas and opinions more accurately and clearly (Nunan, 2003).

The current study's theoretical framework also mostly agrees with Siemens's (2005) concept, that connectivism admits that technology plays a significant role in learning and gives us the freedom to select the method of learning that best suits our needs. Inspired by connectivism theory, the current study focusses on using AI-mediated tools such as the QuillBot application, a technologically assisted educational program that helps to improve writing experiences, including paraphrase skills.

As is the case with students who use the QuillBot application to improve their paraphrasing skills, this learning environment provides opportunities for teachers in addition to offer a personalised learning experience for students. Studies show that using AI-mediated IT tools, like the QuillBot application, has aided students in developing positive attitudes and insights about using the QuillBot application to enhance their paraphrasing abilities. Pupils are excited about using an AI-assisted tool to get better at paraphrasing. Additionally, some

academics contend that digitally mediated environments for learning have improved students' opportunities for learning (Fitria, 2022; Nurul & Siti, 2021).

In this study, students' paraphrasing abilities are enhanced by the use of AI-mediated IT tools such as the QuillBot application. Without doubt, it has improved their educational experiences. Because the AI tool teaches students so much and there is almost no chance of human error. The QuillBot application provides professional learning possibilities for pupils (Kurniati & Fithriani, 2022). Consequently, it offers educators a type of professional orientation. Students' ability to paraphrase has seriously improved as a result of this method of instruction. Students' attitudes about using the QuillBot application to hone their paraphrasing abilities have unquestionably improved (Ginting & Fithriani, 2022). Research has been done on how students use technology, especially AI-mediated tools, to improve their writing skills (Al-Haq & Al-Sobh, 2010; Fakhir, 2015; Gupta & Woldermariam, 2011; Zhu, 2001). Using a parametric test to evaluate covariance, Nazari et al. (2021) investigated the effectiveness of a group format of an AI-driven writing tool for English second postgraduate students in an English academic writing environment with 120 participants. The findings showed that students found the QuillBot application to have many features that were helpful to them as learners, and they were largely in favour of using it to improve their writing. Even though (AI) is a popular issue in education, using it in L2 writing comes with a few challenges. Digital writing applications in L2 writing contexts have not received much attention. Less focus has been placed on the study's conclusions.

The impact of AI on writing output has been found by researchers, but its influence on learning behaviour is still a mystery. Further research on the enthusiasm and perspectives of students regarding using the QuillBot application to hone their paraphrasing abilities is lacking. **Related Studies**

Rolstad (200٥) Meta analyzed studies on the efficacy of programs for English language learners. In addition to using Glass, McGaw, and Smith's technique of including as many studies as feasible in the analysis rather than omitting any based on a priori "study quality" criteria, the study incorporated a corpus of 17 papers conducted since Wouldig's previous meta analysis. It has been demonstrated

that developmental bilingual education programs outperform transitional bilingual education programs, and bilingual education is consistently better than all-English alternatives. According to a meta analysis of research that accounts for the status of English language learners, bilingual schooling has a beneficial impact. It concluded that bilingual education programs are effective in promoting academic achievement and that sound educational policy should permit and even encourage the development and implementation of bilingual education programs. The results showed a positive effect of 86 standard deviations on outcome measures in the native language, with a difference of 23 standard deviations.

Liu and Zhang (2018) collected data from 21 empirical studies (N = 1268) and applied a meta analysis. The aim of the research was to determine if over time, reading instruction assists students in increasing their vocabulary and, if so, whether this effect changed according to the session's period and style. Stata 14.0 was employed for analysis of the collected data. The results explained that: (1) acquiring English vocabulary is significantly enhanced by reading; (2) reading extensively should be provided for a total of three months or one semester; and (3) reading comprehension and vocabulary activities are essential materials for EFL students.

Xu et al. (2019) reviewed studies about the effects of educational technology applications on the writing skills of adult English language learners (ELLs) by using twenty-one independent studies from sixteen publications that were included in the review. They conducted sub-group analyses with six substantive and methodological factors: type of technology, writing genre, program duration, program intensity, measures outcome, and research design. The analyses wre followed up by research and pedagogical implications. Findings showed that technology applications had a significant effect compared to non-technology methods of instruction.

San et al. (2020) determined the standard doprodelles' overall effect scales on the learning outcomes of English language learners in experimental studies. Data was gathered from master's and doctoral theses for this purpose. Meta analysis aims to compare and synthesize study's findings. From 2005 to 2018, the study included thirty master's and ten doctorate dissertations that satisfied the

inclusion criteria. The results showed that achievement in English is significantly impacted by conventional methods (d=0, 98 [0, 83; 1, 12). This shows that traditional methods of teaching English enhance student performance. The results, however, cannot indicate that conventional methods are any more effective nowadays.

Alsufi and AbuSeileek (2021) aimed to determine a general trends length and description of studies on the significance of game strategy in teaching English. A meta-analysis research methodology was used to gather and analyse the research findings. Seventy research papers published during the period 2000-2018 created the study sample. The study's instrument was a meta-analysis checklist which was employed as the study's tool. The study's methodologies and feature games (regular) methodology had the highest frequency, according to the data. Additionally, it demonstrated that among the sample studies that were analysed, the test instrument was the most frequently used, while the most frequent study year was 2016. Conference proceedings are the second most common type of publication. The type and level of participants in the study sample were school, EFL learners, and 16 or more participants.

Rahmati et al. (2021) examined sixty-seven theses and articles out of a thousand studies that had significant abstracts and findings in their meta-analysis of the effects of educational technology in English language learning. The analysis included all publications and theses from 2009 to 2020; however, seven articles were excluded due to insufficient data. Additionally, this study used the sub-branch Kruskal-Wallis test of SPS and CMA as two instruments to determine and assess data. Overall, both fixed and variable model studies had statistically significant impact sizes. Analysis of the effects by study methodology, research instruments, and year of publication showed additional significant effect types.

Elismawati et al. (2021) sought to determine the efficacy of the Think-Pair-Share approach for teaching and learning English. The method, was employed to collect datasheet coding in a meta-analysis research study. It is the researcher's responsibility to code the data found in journal research publications concerning the use of the Think-Pair-Share method for English language instruction. The effect size measurement was used to analyze the data. According to the study's

findings, the Think-Pair-Share approach has a 1.41 total impact size in the teaching and learning of English, placing it in the large-effect group.

A meta analysis study by Seyyedrezaei et al. (2021) aimed (1) to determine the overall impact of educational technology applications on writing performance in English as a Second/Foreign Language (EFL/ESL); (2) to examine substantive factors resulting in variation between studies; and (3) to present a technology analysis specific to a given genre. In this study, sixty-four studies that satisfied the inclusion criteria were synthesized. According to the results, technology applications significantly improved EFL/ESL students' writing skills (g = 1.00). Additionally, moderator analyses incorporating specific study parameters showed two statistically significant moderator variables: the genre of writing and the type of technology, the results of the meta-regression showed a significant connection between the type of technology and writing type and the total impact of educational technology applications. In addition to a discussion of the pedagogical effects, future opportunities in the context of ESL or EFL writing instructions were provided for the application of technology-enhanced language learning (TELL).

Kim et al. (2022) analyzed the impact of automated writing tools, including QuillBot, on the quality of academic writing among university students. Through a meta analysis of 15 studies, it was found that the use of these tools contributed to enhancing students' confidence in their writing skills, in addition to improving the quality of texts and reducing linguistic errors. The study concluded that paraphrasing tools provide immediate support that contributes significantly to the development of writing skills.

Chen (2022) carried out a study with the goal of determining how mobile learning affects the efficiency of teaching and learning English. The study sample included 29 participants who used mobile devices to support their study of English. Mobile learning significantly enhances English learning outcomes, according to the results of this study, which conducted a meta analysis. According to PRISMA guidelines, a balanced effect size of 0.893 was obtained. Possible limitations included the academic level, the period of the activity, the domains of language development that were researched, the programs and devices utilised,

and the area of implementation. The results explained that language is enhanced due to using mobile learning, which supports recognized pedagogical paradigms.

Al Droubi (2023) conducted a study that meta analysed and explained the findings of audiovisual research on teaching the English language. A meta analysis was used as a research approach. The sample consisted of fifty studies that were published between 2000 and 2023. The study tool was a checklist created for meta analyses. Descriptive statistics, such as percentages and frequencies, are used to determine whether there are differences between various features. The findings explained the significance of the meta analysis design to assess the impact of audiovisual chat on teaching and learning. There were more than fifteen participants; most of them were male undergraduates learning English as a second language rather than recent graduates.

Meta Analysis

Since its introduction at the annual convention of the American Education Research Association, the use of meta analysis as a technique to combine quantitative research findings from multiple studies has acquired significant momentum (Glass, 1976). However, given that works like those of Pearson (1904) and Tippett (1931) were already in existence, this method was not wholly novel to nomenclature. Before the 1970s, meta analysis in social research was rather uncommon. This changed when several social scientists started using quantitative synthesis approaches in various fields, particularly social psychology, as demonstrated by Schmidt and Hunter (1977).

A number of books providing helpful guidance and methods for doing meta analyses marked a significant advancement in their publication (Glass & Smith, 1981; Hedges & Olkin, 1985; Schmidt & Jackson, 1982; Rosenthal, 1984). From the 1980s onward, meta analysis gained popularity in a number of fields, including psychology, education, and the medical sciences. This further prompted the meta analysis to be adopted more frequently, which raised the necessity of carefully following strict protocols and guidelines. A seminal contribution in the behavioral and medical sciences is the Cooper and Hedges (1994) Handbook of Research Synthesis, which illustrated the growing emphasis on the quality of methodology in meta-analysis

endeavors. Meta analysis cannot be defined or approached in a way that is generally agreed accepted. There is significant disagreement over how to define a "true" meta analysis. An additional, wider definition of meta analysis was provided by Glass (1976) who defined it as "the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings" (p. 3). More stringent definitions are common though.

Meta analysis, for instance, is described as "a research synthesis that uses a quantitative measure, effect size, to indicate the strength of relationship between the treatments and dependent measures of studies making up that synthesis" by Morgan and Harmon (2003,1376).

The following four major issues have developed as a result of the various descriptions that different authors have proposed in this context. These involve (a) confusion between the general strategy and analysis method, (b) impact size utilised, (c) analysis unit, and (d) meta analysing (Hedges & Olkin, 1985; Hunter & Schmidt, 1990; Rosenthal, 1984).

Concluding Remarks

The breadth of effects that different teaching strategies, such as using the QuillBot application, have on various language outcomes has been thoroughly documented in previous descriptive investigations. Previous studies also looked at the QuillBot application's impact on education, emphasizing the necessity of combining these initiatives to provide an unambiguous, proven basis for language learning. The lack of comprehensive meta analyses on the impact of utilizing the QuillBot application on language results, highlights the area of additional study needed in the educational literature. The purpose of the current study is to find evidence of the impact of the QuillBot application on English language acquisition.

This Study

During the years 2021–2024, the researchers examined previous research studies that explored the impact of applying the QuillBot application on learning the English language through the various public schooling levels. It was discovered that a significant number of investigations led to various findings. To

assist with educational decision-making, to identify research priorities in this field, and to clarify the level of variation between the findings and their fields, a study that emphasizes a thorough analysis of the findings of previous studies within the researchers' knowledge base is currently not available. As a result, the current study is centered with the overall variations, descriptions, and emphasis of the studies on applying the QuillBot application in language learning. It aims to present a review of research on the QuillBot application by examining a variety of variables. The question of the study was what are the general trends, description and focus of research about using the QuillBot application in English language learning related to some features?

This study is significant for several groups. English language teaching and learning research and practice would be significantly impacted by these meta analyses of the data.

This study offers meaningful insights on the efficacy of the QuillBot application's approach by doing a thorough analysis and synthesis of the literature on the application of the program for language learning. In order to make well-informed judgments regarding incorporating the QuillBot application into language learning programs, educators and linguists can utilize these data. In order to improve language skills and acquisition. This would help ensure that teaching strategies are supported by research and relevant to the goal. Understanding the effects of the QuillBot application on learning English could lead to creative methods of instruction in the teaching of languages. English language teachers can discover new methods to pique students' interest, foster collaboration, and foster authentic language use in digital environments by figuring out the best practices and strategies for utilizing the QuillBot application, in order to create more dynamic and interesting learning settings. This study may inspire creativity and experimentation in pedagogical approaches to language learning. Curricula designers could apply the QuillBot application as a learning aid in textbooks to encourage students' communication. The study findings, according to the researchers could encourage pupils to learn and write better. By using grammar checks and paraphrasing, the QuillBot application may help pupils practice writing correctly. Students are able to choose new phrases and apply

them into their own sentences. Additionally, the researchers suppose that it could help students in learning English.

Method

Design of the Study

This study meta analyzed using the QuillBot application in research about English language learning. It is based on using the meta analysis approach in analyzing a sample of research on using the QuillBot application in English language leaning. The study aims to create a more cohesive assessment approach by aggregating and evaluating a wide range of quantitative data from 50 recent studies about using the QuillBot application in English language learning. The strength of the QuillBot application's influence on English language learners' proficiency would be shown in this type of synthesis.

Sample of the Study

The study sample is based on applying specific inclusion and exclusion criteria for the studies that would be included in the meta analysis. In light of the previous information, a sample of 50 studies were suggested for usage; they were conducted between 2020 and 2024. Only sources that can be viewed, especially journals, conference proceedings, and graduate and postgraduate dissertations, were used as the data sources in this study.

Table 1: The Distribution of the Publication Type of the Study

Rank	Publication Type	Frequency	Percentage (%)
1	Journal Articles	٤٦	92.0
٢	Theses/Dissertations	4	8.0
٣	Conference Proceedings	0	0
Total		50	١٠٠

Instrumentation

Criteria of Inclusion

Studies that meet the following criteria were included in this study:

- Paying particular attention to using the QuillBot application to learn English.
- Empirical research published in peer-reviewed journals or graduate theses, dissertations, and conference proceedings.
- Reports with numerical data on competency, engagement, or language learning levels.
- Research involving individuals learning English as a second or foreign language.

Meta Analysis Checklist

The studies were systematically categorized based on several features after identifying relevant research literature that met the inclusion criteria. Coding was done with the following goals in mind; the sample studies were based on the following criteria:

Type of Publication: This research focused on peer-reviewed journal papers, conference proceedings accepted by academic organizations, and previously completed graduate theses and dissertations reachable via academic databases and libraries.

Study Design: Only research with definite experimental or quasi-experimental, descriptive, qualitative or quantitative designs were allowed to meet our selection criteria for review, ensuring that the effect estimates we predict are based on appropriate data.

Skills and Areas: The research that aims to investigate particular English language learning skills (listening, speaking, reading, and writing), and areas (grammar, vocabulary, and pronunciation) impacted by the QuillBot application would be the main emphasis.

Instrument of the Study: The outcomes of the research should include exact copies of any instruments used in data collection and analysis (e.g., tests, surveys, or observational protocols evaluating English language competency or learner engagement).

Participants: Study samples from elementary, secondary, high school, and graduate students learning English as a foreign or second language would be included. Native speakers were excluded.

Effectiveness of the QuillBot application: The efficiency of the QuillBot application in helping participants improve English language skills were included in this research, and in this case, effectiveness would be defined according to a clear operational definition based on learner outcomes.

Participants' gender: In order to determine whether males and females show different patterns with regard to the impact of the QuillBot application on their learning, data about the participants' genders, if provided, were included.

Year of publication: This would assist in focusing on the variety of ways that the QuillBot application has grown and how these developments connected to modern practices in language learning during the period 2020-2025.

In order to distinguish between depth and breadth of material engagement, studies that would be included in the evaluation would examine the duration of the QuillBot application and how it relates to learning outcomes.

QuillBot activities: It includes activities like paraphraser, grammar checker, translator, and summarizer.

Validity and Reliability of the Instrument

A number of specialists in English language instruction and curricula, as well as English language experts from both public and private Jordanian universities, evaluated the research instrument. The jury to evaluate the evaluation tool utilized the following factors: the participants, the study design, language domains, the length of the text, the year and type of publishing. They suggested adding some features and correcting mistakes. In response to comments and ideas for correction, the researchers took into account their suggestions for improving the rubrics and changing certain sections of the study. The data was analyzed by two raters, and the inter-rater reliability between them was calculated and found to be .87, which is acceptable for the purposes of this study.

Procedures of the Study

1- A thorough search of internet databases (such as Google Scholar) was done to locate pertinent studies on the usage of the QuillBot application in English language learning. A mix of search terms and phrases linked to "meta analysis" and "The QuillBot application in English language learning computer-assisted language learning" were employed in order to guarantee a comprehensive evaluation.

2- Two raters set out to identify any specific research that examined the titles and abstracts of the research papers that were obtained. The full-length papers were screened for additional assessment in comparison to the selection and exclusion standards.

3- Data were taken from studies that qualified using a predetermined template. Study features like publication year, and study design (e.g., sample size), information about the intervention (e.g., QuillBot application use and pedagogical techniques), assessments of the results (e.g., learner engagement and language learning outcomes), and applicable statistical findings were all included in the extracted information.

4- Methods applied by the researchers to examine how the QuillBot application was used for English language learning have been analyzed and identified.

5- The variables relevant to the research field using uniform categories that are suitable for all studies were defined.

6- Research findings were extracted and organized for use in the quantitative meta analysis. Moreover, the coding process involved multiple processes, and to ensure the method's trustworthiness, checks were done at each stage regarding the researchers' conclusions.

Data Analysis

One beneficial method for analyzing quantitative research data is meta analysis. In this study, it was employed as the data analysis method. Employing descriptive statistics such as percentages and frequencies. Frequencies of the ten main characteristics and their sub-variables have been shown to be different. Participants, study instrument, areas and skills involved, publishing type, and study design were the main variables.

Findings

The study main objective was to discover QuillBot application activities related to learning the English language. For each study, the frequencies/ percentages for the QuillBot activities for research on using the application in English language learning were obtained as displayed below.

Table 2: Frequencies and Percentages of the QuillBot Activities for Research on Using the Application in English Language Learning

Rank	QuillBot Activities	Frequency	Percentage (%)
١	Paraphraser	٤٩	98.0
٢	Grammar checker	١	2.0
٠	Summarizer	٠	٠
٠	Translator	٠	٠
Total		**٥٠**	**١٠٠**

Table 2 shows that in research on the use of the QuillBot application for learning English, Paraphraser scored the highest frequency (98%), Grammar Checker obtained a low frequency (2%), and Summarizer and Translators had no frequencies (0%).

Analyzing the text length of studies that concentrated on the QuillBot application for learning English was another sub-goal of the study. The texts from the 50 studies were divided into certain categories. Table 3 displays the frequencies and percentages for each category that was computed.

Table 3: Frequencies and Percentages for the Length of Text for Research on Using the QuillBot Application in English Language Learning

Rank	Length of Text	Frequency	Percentage (%)
1	11 to 20 Pages (5001-10000 Words)	23	46.0
2	1 to 10 Pages (250-5000 Words	21	42.0
٣	More than 30 Pages (More than 15000 Words)	٤	8.0
٤	21 to 30 Pages (10001-15000 Words)	2	4.0
Total		٥٠	١٠٠

The text length distribution across the 50 resources that were part of the study is displayed in the table. The majority of the papers, almost 46%, are between 11 and 20 pages long, indicating that researchers frequently favour articles that strike a compromise between conciseness and detail. Furthermore, 42% of the research studies of the materials are between one and ten pages long, suggesting that some research goes deeper into the subject. However, just 4% of the sample studies are longer than 21 pages, and only 8% are shorter (more than 30 pages). This pattern implies that when evaluating the QuillBot application's impact on English language proficiency, researchers typically prefer more thorough assessments. Overall, the data shows that readers favour studies that are manageable for them but still include a significant level of detail.

The study also aimed to uncover broad patterns and characteristics in sample studies about using the QuillBot application in English language learning. In order to address this, the fifty studies were divided into three categories: those that found the QuillBot application more effective than other methods of teaching the English language, those that found it to be less effective, and those that found it to be equally effective. Each classification's frequencies were determined, and the overall frequencies and percentages are indicated below.

Table 4: Frequencies and Percentages for Research on the Effectiveness of Using the QuillBot Application in English Language Learning

Rank	Effectiveness of QuillBot Application	Frequency	Percentage (%)
1	QuillBot Application is More Effective Than Other Methods in Language Learning	50	100.0
0	QuillBot Application Is as Effective as Other Methods in Language Learning.	0	0
0	QuillBot Application Is Less Effective than Other Methods in Language Learning.	0	0
Total		50	100

The results presented in Table 4 indicate a clear consensus on the effectiveness of the QuillBot application in enhancing English language learning. With 100%

of the studies suggesting that the QuillBot application is more effective than other regular instruction methods, the data strongly supports its superiority in improving language skills. These results highlight the importance of the QuillBot application model in educational research but also suggest its potential as a transformative strategy for language instruction, warranting further exploration and application in diverse learning environments.

The study also examined the research method employed in previous studies on using the QuillBot application for learning English. They included experimental and descriptive, one-group pre/post-tests**,** control/experimental pre/post-tests**,** and mixed-methods (qualitative and quantitative, such as tests, questionnaires, and open-ended interviews), qualitative like interview, and descriptive only (e.g., questionnaire were among the categories created to address this. Table 5 displays the frequencies and percentages for every design.

Table 5: Frequencies of the Design of Studies on Using QuillBot Application in English Language Learning

Rank	Design of the Study	Frequency	Percentage (%)
1	Qualitative like Interview	19	38.0
	Descriptive Only (e.g., Questionnaire)	16	32.0
3	Both Qualitative and Quantitative (e.g., Test and / or Questionnaire, and Open–ended Interviews)	6	12.0
4	Control/Experimental Pre/Post–Test only	4	8.0
4	One–group Only	4	8.0
5	Experimental and Descriptive	1	2.0
Total		٥٠	١٠٠

According to the findings in Table 5, research on the QuillBot application's use in English language learning has used a variety of study methods. Notably, 38% of the research used the qualitative method, resulting in it being the most common method. With 32% of the sample, descriptive studies that used instruments like questionnaires also played a significant role. On the other hand, with only 8% of the sample as a whole, the control/experimental pre/post-test and one-group pre/post-test models were the least represented. A complete understanding of the

effectiveness and impacts of the QuillBot application in enhancing English language proficiency becomes effective by the inclusion of several designs, which shows the complex nature of the research area.

Examining the research participants in the QuillBot application for English language learning was another goal of the study. To solve this, the study sample's participants were categorized by number, kind, and level. Following the relevant classification of the studies, the frequency and percentage for each category were determined and shown in the table below.

Table 6: Frequencies and Percentages for Participants' Type, Level, and Number for Research on Using the QuillBot Application in English Language Learning

Rank	Participants		Frequency	Percentage (%)
1	**Level**	**Undergraduate**	26	52.0
٢		**Graduate**	٢١	42.0
٣		**School**	٣	6.0
١	**Type**	**EFL Learners**	٤٤	88.0
٢		**ESL Learners**	6	12.0
١	**Number**	**15 and More**	٤٥	90.0
٢		**1-14**	٥	10.0
Total			50	١٠٠

The study's sample characteristics are displayed in the table, with a particular focus on the research participants. It is important to note that 58% of the sample consists of undergraduate students, while 42% are graduate students. However, only 6% of the sample are students in school. According to the data, 88% of participants were English as Foreign Language (EFL) learners, while just 12% were English as Second Language (ESL) learners. A tendency towards bigger sample sizes in the evaluated research is also shown by the fact that almost all participants (90%) come from groups of 15 or more people. The research's emphasis on undergraduate EFL learners is highlighted by this distribution, which implies that the QuillBot application might work especially well for this group. Overall, these particulars offer a helpful framework for comprehension.

The study also aimed at examining the general structure and characteristics of research employing the QuillBot application for learning English. The fifty sample studies were organized by publication type to address this. The frequency of publication types for each study was recorded, and the total frequencies and percentages were determined, as indicated in the table.

Table 7: Frequencies for Publication Type in Research about the QuillBot Application in English Language Learning

Rank	Publication Type	Frequency	Percentage (%)
١	Journal Articles	46	92.0
2	Theses/Dissertations	4	8.0
3	Conference Proceedings	0	0
Total		50	١٠٠

The distribution of publication categories related to research on the QuillBot application in English language acquisition is clearly shown in Table 7. According to the data, journal articles lead, conducting up to 46 publications and 92% of the sample overall. This frequent appearance in peer-reviewed journals shows a high level of research interest and an important amount of data assisting the QuillBot application's ability to improve language skills. However, with just four publications in each category, theses and dissertations take up only 8% of the sample. According to this, although the QuillBot application received focus at the level of graduate studies, it has not been thoroughly examined as frequently as the significant research that has been published in journals, showing that the research topic has not received much focus in theses and dissertations. These results as a whole show that recognized academic studies include almost all of the research on the QuillBot application, identifying journals as the main source of approved data for this research.

The study also concentrated on examining specific language skills and research aspects connected to the QuillBot application's use in English language acquisition. Each category's frequency and percentage were identified, as stated below.

Table 8: Frequencies and Percentages for Skills and Areas in Research on Using the QuillBot Application in English Language Learning

Rank	Skills and Areas	Frequency	Percentage (%)
1	Writing	50	100.0
٠	Listening	٠	٠
٠	Grammar	٠	٠
٠	Reading	٠	٠
٠	Vocabulary	٠	٠
٠	Pronunciation	٠	٠
٠	Speaking	٠	٠
٠	Mixed Language Skills/Areas	٠	٠
Total		٥٠	١٠٠

The table shows that the writing skill had 100% of the analyzed research. It also shows that increasing a learner's ability to write effectively became the primary aim of the study on the QuillBot application. Other skills, on the other hand, were not represented; each taking up 0%. This points to a gap in the literature that demands additional research, showing a balanced, however less focused approach than writing. Overall, the distribution shows that writing has received all focus, while other skills have gotten no focus.

The research instruments utilized in research on the QuillBot application on English language learning were examined as well in this research. The study focused on classifying instruments from 50 coded studies into the following categories: test, questionnaire, open-ended interview, observation checklist, and mixed instruments. Table 9 shows the calculated frequency and percentage of each type of instrument.

Table 9: Frequencies for Study Instrument in Research about the QuillBot Application in English Language Learning

Rank	Instrument of the Study	Frequency	Percentage (%)
1	Questionnaire	17	34.0
2	Mixed Instruments	12	24.0
2	Test	12	24.0
3	Interview	9	18.0
٤	Checklist	٠	٠
Total		٥٠	١٠٠

According to the findings in Table 9, research using the QuillBot application for English language learning mainly is based on questionnaires, accounting for a notable 34% of all resources. On the other hand, the usage of instruments like tests and mixed instruments accounts for the same percentage (12%). However, just nine research studies used an open-ended interview, and none applied for observation checklists. With every aspect examined, the table shows the tendency towards descriptive research methods, which could improve the validity and depth of the results relevant to how effectively the QuillBot application is effective in improving skills in the English language.

This study examined the year that studies on the QuillBot application's use in English language learning were published. The fifty coded studies were divided into the following ranges based on the year of publication to respond to the study research question: 2021–2024 and 2016–2020. Table 10 shows the calculated frequencies and percentages for each category**.**

Table 10: Frequencies for Date of Publication for Studies about the QuillBot Application in English Language Learning

Rank	Year of Publication	Frequency	Percentage (%)
1	2021-2024	50	100.0
2	2016-2020	٠	٠
Total		٥٠	١٠٠

The data presented in Table 10 shows a different distribution of publications throughout the years in the sample selected for the meta-analysis. Additionally, the years 2021–2024 saw an enormous rise in accounting for all publications. Given changing needs of education, this change may indicate an increased focus on researching the methods of instruction, such as the QuillBot application. Overall, the data shows how studies in the field were dynamic as well as how important it is to continue researching successful teaching methods. On the other hand, the 2016–2020 period accounted for 0%.

The gender of participants in research on the application of the QuillBot application in learning the English language was examined as well. To approach this concern, the categorized studies were categorized depending on gender, including participants that were male, female, or non-specified. Each gender category's frequency and percentage have been obtained and displayed in Table11.

Table 11: Frequencies of the Participants Gender in Research about the QuillBot Application in English Language Learning

Rank	Gender of Participants	Frequency	Percentage (%)
1	Non-specified Gender	٤٦	92.0
2	Female	٣	6.0
3	Male	١	2.0
Total		٥٠	١٠٠

Participant gender distribution in the studies examined in the meta analysis appears in the table. Additionally, 92% (46 out of 50) of the studies did not classify the participants' gender, showing an inclusive sample that could increase the findings' applicability. On the other hand, three studies with only female participants accounted for up to 6% of the total, while one study had only male participants. Furthermore, the small number of studies focusing just on one gender indicates the opportunity study gap regarding the unique gender-related experiences and results in QuillBot situations for application.

Discussion

The current study purposes to offer a meta-analysis of studies that look at the use of the QuillBot application in learning English, including the QuillBot activities, text length, the QuillBot application effectiveness, skills/areas, publication type, study design, participants, participant gender, the QuillBot application, and year of publication. The results of the research that sought to determine the broad patterns, description, and emphasis of the QuillBot application's use in English language acquisition are discussed in this part.

The findings of the study show that paraphraser got the highest frequency of all QuillBot activities for research on using the QuillBot application in English language learning. This shows that most students used the paraphraser activity for correcting their writing mistakes. This already includes checking grammar in text and summarizing. All QuillBot based activities (grammar checker, summarizer, and translator) are already included in the paraphraser activity. The Paraphraser activity is helpful for students in checking their grammar mistakes and correcting them. It is also helpful in summarizing their texts and correcting the mistakes in them. Previous studies (e.g., Bin & Michael, 2019) show that online paraphrasing tools such as the QuillBot application enable users to modify text without changing the original meaning. The goal of paraphrasing tools, according to Fitria (2022), is to replace words, phrases, sentences, and even entire paragraphs with different versions of the content and without changing the text's overall meaning. Many studies conducted by Nurul and Siti (2021), Kurniati and Fithriani (2022), Ariyanti and Anam (2021), and Khabib (2022) show that online paraphrasing tools can decrease students' challenges with academic writing. According to previous studies, one of the main benefits of online paraphrasing tools is that they can help students with a variety of tasks, including rewording vocabulary from the source text, choosing appropriate verb tenses, changing word forms, and paraphrasing proper discourse markers (Fitria, 2022; Fitria, 2021; Nurul & Siti, 2021; Ariyanti & Anam, 2021). All of them support this finding and show that the paraphraser activity was helpful in enhancing students' writing by helping them in correcting their mistakes and writing correct sentences and paragraphs.

The majority of articles were average in size when it included text length: 46% of the research was between 11 and 20 pages. According to the majority of research analyzed in this study, the QuillBot application was found to be more effective than other methods. Moreover, a significant number of qualitative examinations (38%) pre-tests and post-tests were the only experimental or control types employed in any investigation. This is why there are not more experimental research studies that could provide additional evidence of the QuillBot application's efficacy. This result is in disagreement with the findings from Boulton and Tom (2017), that meta-analysis is a systematic quantitative statistical technique used to organize, expand, and extract information from a lot of data gathered through various research studies.

In addition, 52% involved undergraduate EFL students, EFL learners were the largest group of participants overall, accounting for 88% of all research. To comprehend various experiences, more research on ESL learners is required. This result is line with the findings from Driscoll (2005), that learning English is the method by which non-native speakers (EFL and ESL) improve or gain proficiency in the language.

Ninety-two percent of the literature consisted of journal articles, which indicates active scholarly interest when considering publication type. Theses, dissertations, and conference proceedings accounted for 8% of the literature. This indicates that scholarly debate or postgraduate studies still rarely address the QuillBot application. This result is line with the findings from Rahmati et al. (2021) who examined theses and articles that showed significant abstracts and findings in their meta-analysis of the effects of educational technology in English language learning.

The purpose of this research is to provide a critical analysis of the body of literature already available on the use of QuillBot in learning English language skills (listening, speaking, reading, and writing), and areas (grammar, vocabulary, and pronunciation). Writing received the focus of all the samples studied in the outcomes. This result is line with the findings from Turan and Akdag-Cimen (2020), Chingakham (2020), and Senjaya and Muhtadi (2023), who found that the QuillBot application was mostly helpful in learning the writing skill.

Applying a questionnaire strategy, the research consisted of a variety of data collection approaches as part of its research methodology, which got 34%. Tests

and mixed instrument acquisition were used to a far lesser degree than other traditional methods (24%). This result is in disagreement with Alsufi and AbuSeileek (2021) that showed the test instrument was the most frequently used.

The gender distribution showed that non-specified gender was enrolled in a significant number of the studies (92%). Each study that occurred (100%) showed that using QuillBot was preferred over using other methods of instruction. This result is in disagreement with Al Droubi (2023) in which the study results shown were mostly male.

In this study, the QuillBot application is therefore suggested to improve learning of the English language since the respondents show an active role in the method and effective findings have been achieved. Still, there are research gaps regarding certain specific skills and research instruments that require additional research. In order to provide a comprehensive and thorough knowledge of the QuillBot application as a teaching instrument, future research should continue to focus on all of its various aspects, including previously unexplored research.

Conclusions

This study provides some beneficial content for research on the QuillBot application in English language learning. Moreover, this research tried to emphasize the significance of new methods for productive EFL-ESL instruction, mainly the QuillBot application. The research shows that by supplying an additional and online instruction model, student participation and language learning improve. With the support of these techniques and resources, a teacher can respond to the demands of the students, who are accepting contemporary instructional methods. Furthermore, it should be the responsibility of curricula developers to incorporate the QuillBot application into their courses so that students feel more comfortable using the language in authentic situations. As a result, this study also revives the QuillBot application as a significant method of learning and indicates that learning participants, including teachers, students, and researchers, analyze and employ different educational models that enhance learning results.

Based on the findings of the research, this study has certain recommendations. Teachers can enhance the teaching and learning process by utilising the QuillBot

application. While learning English, students can use the QuillBot application to hold their attention while receiving direct input**.** This research indicates that the most frequently studied aspect of QuillBot application use in learning the English language is writing. In order to encourage the growth of writing skills, teachers might concentrate on using the QuillBot application in learning other English language skills and areas. The QuillBot application could be an efficient way for enhancing learning the English language. Students need to be encouraged to utilise this application for enhancing their skills in learning the English language. Writing is the main skill studied by using the QuillBot application, according to the research. In order to encourage their growth, students ought to focus on improving their writing abilities by using the QuillBot application. Additionally, language learners can practice their skills in an educational and interesting way. Curricula designers should consider including the QuillBot application into language learning programs to enhance the educational experience of students. It is recommended that curricula designers encourage the use of the QuillBot application in language classrooms. QuillBot based-exercises and assignments that meet the needs of students and correspond with curricula goals can be implemented. Additional research should be conducted to investigate the effectiveness of the QuillBot application in various English language teaching and learning contexts related to different language skills and areas, since there is currently a lack of knowledge on this topic. Using a variety of research techniques, such as both qualitative and quantitative approaches, researchers should examine how the QuillBot application is used in teaching and learning. The majority of the research that has been done so far has been on schools and EFL learners. The usefulness of the QuillBot application for various age groups and skill levels needs more research. Finally, this study has certain limitations. The study focuses on meta analyzing research about using the QuillBot application in English language learning during the period 2000-2024. Participant in these studies were ESL and EFL learners. Therefore, the results can only be generalized to similar research samples using the meta analysis method.

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