

## **Automated Corrective Feedback Program (Grammarly): A Study of Effects on the Writing Skills of Saudi EFL Undergraduates**

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### **Abstract**

*The current study investigates Grammarly by examining its impact on Saudi EFL learners' writing skills. A total of 30 female undergraduate students, ranging in age from 20 to 23, majoring in English Language and Translation at a public university in Saudi Arabia, were selected as the research sample. The participants were randomly assigned into two groups; 15 in the control group and 15 in the experimental group. Following a mixed method study design, data were collected using two research instruments: a pre- and post-test, and an attitudinal questionnaire survey. The findings revealed no significant differences between the two groups in the pre-test. On the post-tests, however, the experimental group performed better than the control group, showing minor improvements in writing skills after using Grammarly. The majority of participants reported satisfaction with the feedback provided by Grammarly on grammar and usage but not regarding content and organization. Overall, the findings of the questionnaire survey demonstrated high positive perceptions toward Grammarly. Most participants reported that receiving immediate corrective feedback helped alleviate apprehension and improved their self-confidence and writing skills. Accordingly, the potential of Grammarly to improve English writing skills has been confirmed by this research, with potentially valuable pedagogical implications for EFL teachers and learners.*

**Keywords:** *Writing, Higher Education, Technology, Grammarly, automated feedback programs, EFL learners.*

### **1. Introduction**

Academic writing is a complex skill to acquire; many researchers have indicated that it is one of the hardest skills to master even in one's first language let alone in a second language; it is not a skill that comes naturally [1][2][3][4]. For EFL learners, developing English writing skills could be challenging since they often do not have sufficient opportunity to practice writing in or out of the classroom. Given the fact that English is by far the most widely spoken language, the importance of being able to write in English cannot be overstated [2],[5][6][7]. Providing EFL learners with corrective feedback can significantly aid them to enhance their writing skills. Research has found that it is one of the critical factors that influence and develop writing skills [8][9]. Feedback is described as remarks made by a reader to a writer in order to assist the writer in making helpful changes.

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Several researchers believe that corrective feedback is an essential technique for teachers to use to guide their students in the right direction; it is considered to be a crucial approach to developing students' knowledge, boost their motivation to acquire good writing skills and develop their metalinguistic awareness [6], [8][9]. Some researchers, however, have started to question the effectiveness of corrective feedback as a tool to improve students' writing [9]. They posit that the effectiveness of this technique depends on how teachers deliver feedback, and more importantly how the students deal with the feedback that they receive; some students ignore or misuse corrective feedback, which renders it of no benefit to them [9][10][11]. Moreover, Truscott [12] indicates that corrective feedback could harm students' writing fluency and the development of their writing skills. He doubted the teachers' abilities to deliver adequate and compatible feedback and doubted the learners' capability and willingness to use the feedback effectively.

Several styles of corrective feedback are possible, including direct and indirect feedback, written feedback, and automated feedback. Direct feedback occurs when the teacher explicitly indicates an error made by the student. While indirect feedback happens when the teacher demonstrates that a mistake has been done by the student but does not give the proper form, making the student figure out the solution on their own [10]. Written feedback on writing tasks is the most common type of feedback reported in the literature. Written corrective feedback is mainly given by teachers, while automated corrective feedback is provided automatically by different programs to analyse students' writing and generate feedback [13]. Many researchers have identified the differences between teachers' written corrective feedback and automated corrective feedback generated by computer programs. In general, automated corrective feedback programs have been criticised for being unreliable when it comes to judging and evaluating critical thinking, creativity, and rhetorical knowledge [13][14]. Teachers, on the other hand, do not always have the time to provide immediate corrective feedback [8].

Fortunately, corrective feedback programs have continued to be developed and improved and the new corrective programs on the market can offer great benefits to educational environments [3],[8],[15][16]. Technology has made new methods and techniques to language instruction and language evaluation possible and, if used properly, can effectively enhance students' foreign language acquisition and comprehension [3],[17]. Automated corrective feedback programs can help teachers cope with large classes and reduce the hours spent commenting on and correcting student papers; moreover, students can get feedback on their work anytime they need it within a much shorter time, both in and out of the classroom [9], [18][19]. There are many automated correctional feedback programs on the market, such as Grammarly, ProWritingAid, WhiteSmoke, and Paper Rater. They are available on the different software operating systems, i.e., Windows and Mac, and some are available for download on both iOS and Android. Most of these programs analyse organisation, vocabulary, grammar, spelling, punctuation, and style errors in a piece of writing. These programs analyze the text and compare it to examples from the same literary genre in a large database [13].

The focus of this study is on just one of these programs: Grammarly since it is the most known program and over 30 million people are using it every day (Grammarly Inc., 2021). Grammarly is an automated corrective feedback program created to improve English language writing in academic formal and informal contexts by offering corrective feedback on a given text [20]. It can recognise spelling, grammar, punctuation, word choice, sentence structure, and style errors and detect mistakes in over 400 grammatical rules.

The provision of corrective feedback can greatly help overcome writing difficulties in English as a foreign language [8]. However, while numerous researchers have compared the effectiveness of direct feedback with indirect forms of feedback [21][22][23] and several studies have examined the impact of written corrective feedback on EFL students'

writing skills (e.g. [6],[24][25], far too little attention has been paid to automated corrective feedback programs [13],[17][26]. Another research gap in the literature is that few studies examined the students' perceptions of such programs after using them [27][28].

There is a growing interest among researchers in automated corrective feedback programs, especially Grammarly, which is used by over 30 million people (Grammarly Inc., 2021; [13], [26][17]. Nevertheless, despite this ever-increasing interest, the ability of such computer programs to correctly evaluate and judge written texts and their ability to actually enhance students' writing skills require more investigation [17]. Further, to the best of the researcher's knowledge, little to no prior research has investigated the impact of Grammarly on enhancing EFL writing skills within the Saudi context. Therefore, the current research attempts to contribute to filling this gap by investigating the effectiveness of Grammarly and its potential to enhance EFL writing skills. This study also explores the students' perceptions of this program. This study builds on the research base on automated corrective feedback in L2 writing by posing two research questions:

1. To what extent does the automated corrective feedback program Grammarly play a role in enhancing EFL students' writing skills?
2. What are EFL Saudi undergraduate students' perceptions of the automated corrective feedback program Grammarly?

## **2. LITERATURE REVIEW**

### **2.1 Theoretical Framework**

The impact of corrective feedback has been frequently studied, and it has been generally concluded that it is an essential tool for developing L2 writing skills [9]. Different researchers have defined corrective feedback in numerous ways. According to Ur [29], corrective feedback provides the learners with information regarding their current performance in a required task. Similarly, Bichener and Storch [21] describe corrective feedback as a type of written reply to second-language learners' linguistic errors in writing.

A number of sociocultural, cognitive, and socio-cognitive theories concur on the positive effect of corrective feedback on encouraging learning and enhancing L2 writing skills [30]. Vygotsky's sociocultural theory indicates that learning is dialogically based; acquisition happens within the interaction itself, not as a result of the interaction [10]. For cognitive functioning to take place, learning must contain an active teaching process, teachers can use conversation to interact with their students and assist them in overcoming misconceptions through corrective feedback [10]. Within the sociocultural field, corrective feedback is seen as a powerful component of the learning experiences and a crucial element of scaffolding in L2 development [21]. With the aid of teachers, students can utilize scaffolding to generate what they would not be able to achieve on their own by using the target language [31]. In other words, providing feedback helps stimulate the Zone of Proximal Development (ZPD), which indicates the gap between what students can accomplish independently, and what can be achieved with teachers' aid or in association with more competent peers. From Vygotsky's sociocultural theory, feedback has been shown to help learners in detecting errors and assists students in correcting such errors and improving their writing [32].

According to cognitive theory, corrective feedback is a critical element in the growth of L2 implicit and explicit knowledge [33]. Cognitive trust, affective trust, and self-efficacy are vital elements in the cognitive theory that could influence the effectiveness of the feedback provided [34]. Interpersonal trust is comprised of both affective and cognitive trust, and providing feedback from a teacher who is sharing interest with the students

helps boost the inner cognitive and affective trust, which in turn stimulates the motivation to perform better and have an environment of psychological safety [35]. Based on cognitive theory, the type of feedback is very critical and has a great impact on the students [36]. Negative feedback is usually more challenging to receive by the students; when the teacher gives a lot of negative feedback, the cognitive trust may be lowered, whereas positive feedback may enhance cognitive trust [34]. Moreover, negative feedback tends to make students put more effort into their work, whereas positive feedback makes them repeat the same effort. This is because providing positive feedback indicates that the given assignment was accomplished correctly, and when a student completes the task correctly, their trust and confidence in completing the next one accurately increases [36]. Another critical element is self-efficacy. Feedback provided to students with high self-efficacy will be more practical and effective [34].

Since 1960, automated scoring programs have been created with the goal of reducing time when marking written work and assisting teachers in providing comments on students' essays [37]. Rapid developments in artificial intelligence technology have significantly improved corrective feedback programs since the 1990s and, because of their many advantages, the use of automated writing evaluation programs for assessment purposes has flourished in second language writing classes [17],[38]. Today, with the ubiquity of the Internet, automated corrective feedback programs have become an attractive investigation topic for researchers worldwide. Numerous researchers have conducted studies on teachers' corrective feedback and its impact on English language writing skills. Some of these studies are presented below.

## 2.2 Writing Skills in EFL

Academic writing is a complex skill to master; many researchers have indicated that it is the most sophisticated skill to learn compared with other language skills [2][3][4][5]. Writing requires a great deal of mental effort. It is a highly dynamic skill involving several processes including pre-writing, while-writing, and post-writing. Writing is viewed as a journey of exploration, as authors struggle to think, produce, and put their thoughts together while trying to find their path [39]. According to Zamel [40], writing is a nonlinear, exploratory, and creative process in which authors explore and produce ideas while attempting to approach meaning. Planning, gathering data, drafting, revising, rewriting, and editing are just a few of the steps involved. A number of conscious cognitive processes need to be engaged simultaneously to express opinions and ideas in writing. Meaning needs to be translated into words and sentences before it is committed to writing, paying attention to syntax, vocabulary, and coherence. EFL students face additional challenges in learning to write since they generally have limited vocabulary, idioms, cultural understanding, and expertise with L2 rhetorical tactics [1],[3]. Researchers state that writing skill is essential for second language and foreign-language learning development. Therefore, more time should be spent in teaching writing skills so that EFL learners are prepared to communicate successfully in real-life circumstances as well as in educational settings [3].

Writing, according to Haring-Smith [41], is a communicative activity that involves sharing one's thoughts and ideas with others. Similarly, Al-Subaihat, and Bataneh [3] describe writing as an activity that encompasses aspects of communication such as organisation, syntax, and vocabulary, not simply a quantity of words generated in a particular period. Numerous researchers have conducted studies on why mastering English writing for EFL learners is challenging; for example, Huwari and Abd Aziz [42] reveal that writing involves several processes, starting with gathering the appropriate data and finishing with the final editing process, making it more difficult for EFL learners to master. Furthermore, Huwari and Abd Aziz [42] state that EFL learners do very little writing in English; they do not practice English writing sufficiently, making it challenging for them to master good and fluent writing skills. This finding is compatible with the results obtained by Al-Subaihat and Bataneh [3]. Similarly, several researchers, e.g., [2],

[5][6] have indicated that Saudi learners, in particular, do not have sufficient opportunity to practice writing skills in and out of the classroom.

Furthermore, in a study conducted by Salem [43], 50 undergraduate students majoring in the English language were asked to give their opinions regarding writing in English. Most of the students reported that they felt anxious when tasked to write about a particular topic by their teachers. They lacked the technical abilities necessary to write well. They had no clue where to begin, how to construct their thoughts, or conclude the piece they were writing. They repeated their thoughts and ideas frequently, made few, if any, good arguments, committed serious grammatical and punctuation errors, and included irrelevant data. In a similar study, Ismail [39] investigated the perceptions of 64 female students on writing skills using a questionnaire survey and a focus-group interview. The majority of the students had a pre-intermediate level of English. The overall results indicated a positive attitude towards writing in English. Furthermore, the study reported that most students believed in the value of English writing skills for their current studies and future careers and were well aware of the necessity of developing their English writing skills.

Moreover, according to Al-Subaihat and Bataineh [3], EFL learners face difficulties to write fluently due to their limited vocabulary and their incomplete knowledge of the English language's grammatical structures. This finding concurs with Abdel-Sayed's [1] findings. Additionally, Al-Subaihat and Bataineh [3] indicated that writing should be given more attention in EFL lectures and learners should be given more time to practice their English language writing skills.

Ahamed [44] investigated and analysed writing errors (i.e., in grammar, punctuation, lexicon, spelling, and discourse) committed by 20 EFL students from King Khalid University in Saudi Arabia to determine their origin and reviewed the variables that lead to these errors. The results revealed that EFL students commit writing errors for several reasons: Arabic language phonology interferes with English language spelling, over generalisation and simplification rules in the target language, weak teaching techniques and lack of writing practice, failure to memorise the spelling of words, and the complexity of English articles. Moreover, the researcher indicated that learners do not receive sufficient feedback on their writing from their teachers, which impinges on the development of their writing skills.

### 2.3 Written Corrective Feedback

Written corrective feedback is frequently referred to as the correction of any grammatical or spelling errors [21]. It has been frequently investigated during the past decades, especially in the second language acquisition and second language writing fields [45][46]. Different researchers have given different definitions for written corrective feedback. Written corrective feedback, according to Loewen [47], is comments delivered just after the text has been submitted. Brookhart [48] makes the point that written corrective feedback lasts longer than spoken input. While Hyland and Hyland [9] indicate that written corrective feedback is more than just marks or grades on a student's page.

The importance of written corrective feedback in EFL lies in understanding second language acquisition processes [45]. Many researchers [6], [22] have indicated the positive impact of the teachers' corrective feedback on EFL students' writing skills and have reported positive findings on the students' perspectives of written corrective feedback; they value the written form more than oral and peer feedback. In a study conducted by Alhazzani and Altalhab [6], the researchers investigated the effect of written corrective feedback provided by the teacher on 50 female undergraduate Saudi students to determine if the written corrective feedback helped to enhance the students' writing skills (i.e., grammatical and lexical accuracy). The participants were divided into two groups, an experimental group, and a control group. The results revealed that, although both sets of students made numerous mistakes in their writing, the experimental group appeared to

perform considerably better on the final test than students in the control group. The findings confirm that written corrective feedback provided by teachers had a substantial positive impact on the students' lexical and grammatical correctness.

That being said, written corrective feedback has also been widely criticised for being misinterpreted by students, being unclear to them, being too strict, and being excessively concerned with mistakes [9]. Several researchers [11][23] doubted teachers' written corrective feedback's effectiveness in terms of developing second language learners' writing skills. Interestingly, in a longitudinal study of 16 weeks conducted by Ferris et al. [23], the researchers found that the teachers' written corrective feedback might not be as helpful as it is often quoted to be if it is not followed by discussion and clarification.

#### 2.4 Automated Corrective Feedback

New technologies have introduced new methods and techniques in language instruction and language evaluation [17] making technology an efficient tool for language learners. The use of software that can evaluate student work automatically has increased as a result of technological improvements. This type of software is frequently referred to as automated writing evaluation or automated corrective feedback. Such software evaluates assessable aspects of a text, like text complexity and syntax, by comparing it to a comprehensive database of writing associated with the same genre that was produced in response to a certain question or rubric [13]. Automated corrective feedback has mainly been used for IELTS and TOEFL exams across the world. Their goal was to efficiently and properly evaluate essay content [9]. Chapelle et al. [14] describe automated corrective feedback as individualised feedback that has been especially designed to guide students in their writing and raise their awareness about specific writing errors that they have made. In comparison, Parra and Calero [17] describe automated corrective feedback as a new computer tool used in different writing genres and in multiple contexts, such as the educational settings, to give immediate writing evaluation feedback.

Numerous researchers have compared the effectiveness of automated corrective feedback programs with the effectiveness of teacher corrective feedback. Zhang and Hyland [49] investigated the differences between teachers' corrective feedback and automated corrective feedback programs on 2 EFL Chinese students in their third year. Their findings indicated that the teachers were better able to identify writing mistakes than automated corrective feedback programs. Moreover, the teachers tended to correct the students' errors, while the automated corrective feedback programs only highlighted the mistakes. This places the feedback given by automated feedback programs in the indirect correction category, as indicated by Ferris et al., [23]. Khoii and Doroudian [50] compared the impact of an automated corrective feedback program (i.e., My Access) and human scoring on 22 EFL learners' writing performance. The students were divided into two groups and were given pre-post essays tests to measure their writing skills. The findings revealed no notable differences in the pre-test results for the two groups; however, the experimental group that used the automated program to score and review their essays outperformed the control group that received the teacher's feedback on their writing. However, surprisingly, the students in the experimental group were not satisfied with the feedback given by the corrective feedback program; because they still expected their teacher to look at their writing after they had finished. Furthermore, Hockly [13] questioned automated corrective feedback programs' ability to analyse students' critical thinking, creativity, and rhetorical knowledge.

Lee [16] conducted a longitudinal case study over one year on 2 Korean university undergraduate students aged 22 and 23 years. One student had an advanced English proficiency level and the other an intermediate level. The researchers investigated the long-term effect of an automated corrective feedback program (Criterion) on the development of the students' writing skills. The study's findings revealed an overall improvement in the students' writing proficiency and writing skills. This finding is

compatible with the results attained by Parra and Calero [17]. Moreover, the results showed a significant improvement in fluency and grammatical complexity. Also, the overall confidence of the students' writing increased noticeably due to regular writing practice.

### 2.5 Students' Perceptions of Corrective Feedback

Providing corrective feedback to the students on their writing performance is typical pedagogical work for EFL writing teachers. Several researchers believe that students are active participants and vital elements in their learning achievements and should not be seen as passive recipients of corrective feedback; therefore, understanding their perceptions and level of engagement is essential for EFL writing teachers [51]. Most teachers expect their students to actively take up the comments they get from them [52][53].

Students' engagement can refer to the degree to which learners are involved or devoted to their study as evidenced by their answers to texts and attitudes toward writing [49]. According to Han and Hyland [52] learners' engagement with corrective feedback can be cognitive, behavioural, and affective where cognitive refers to how deeply the learners can process the corrective feedback, behavioural refers to how learners act when receiving corrective feedback and affective refers to the learners' emotions when they receive the corrective feedback (e.g., anxiety, joy, like, and dislike) [54].

Overall, research on students' perception of the corrective feedback they receive that is largely based on questionnaire studies is encouraging and positive. Students seem to value the feedback and instructions given to them and feel frustrated if they do not get corrective feedback on their work [9]. However, several researchers [9][23] have revealed individual differences in the students' perceptions of written corrective feedback. Some learners appreciate corrective feedback that helps improve their writing and some are hesitant to accept corrective feedback. According to Ferris et al. [23], students' external conditions and internal features appear to affect their ability to benefit from the corrective feedback provided to them. However, research on learners' perceptions of automated corrective feedback is still limited [26],[28],[49].

According to Zhang and Hyland [49] different feedback sources can impact students' perceptions of it; they indicated that students seem to engage better with automated corrective feedback than with teachers' corrective feedback. Another important factor mentioned by the researchers is the learners' language proficiency. When students have limited language proficiency, they will have more difficulty comprehending the corrective feedback regardless of its source.

### 2.6 Grammarly

Grammarly is a proofreading program that can detect mistakes pertaining to over 400 grammatical rules. It was created in 2009 by Lytvyn, Shevchenko, and Lider, with the intention of helping people communicate more efficiently and assists both students and teachers in correcting EFL writing (Grammarly Inc., 2021). Grammarly supports multiple operating systems, such as Mac OS, Windows, and Microsoft and, recently, it has added a new feature to smartphones; users may now use Grammarly as an additional keyboard that suggests grammatically acceptable following words depending on what they have previously typed. It offers both a free and a paid version. With a free account, individuals can develop their everyday writing skills. A premium account offers individuals the opportunity to develop their writing further and make their communication sound as polished as possible. Grammarly categorises the errors according to spelling, grammar, punctuation, word choice, sentence structure, and style in both versions. Furthermore, Grammarly offers plagiarism detection, formality level, fluency, and vocabulary enhancement in the premium version.

In a study conducted by Parra and Calero [17], the researchers examined the effects of using automated corrective feedback programs (i.e., Grammarly and Grammarly) as a tool to enhance EFL undergraduate students' writing skills. Based on the findings of the researchers, the students' overall writing quality increased significantly after using automated corrective feedback programs and their awareness of spelling and grammar errors also increased. Moreover, the results revealed that the students had a positive attitude to using the two programs. O'Neill and Russell [27] conducted a study on a sample of 96 students to assess Grammarly as a corrective feedback tool and the students' perceptions of it after using it. The participants were divided into an experimental group (54 students) and a control group (42 students). The findings revealed that the students had a positive perception of the program; most of the students were satisfied with the feedback time, the quantity of the feedback they received, the higher grade that they obtained, the long-term advantages to their writing skills and the confidence the program gave them to proofread their writing independently. In a recent study by Dodigovic and Tovmasyan [20], the researchers investigated the accuracy of the feedback provided by the automated feedback program (Grammarly) by checking errors in 56 essays written by first-year undergraduate students. The essays were read by three graduate students and a professor of English to detect errors before Grammarly was used to indicate errors. The findings showed that students were able to use Grammarly as an additional tool to detect mistakes and obtain feedback; however, teacher supervision was necessary. A more recent case study by Koltovskaia [38], conducted on 2 ESL undergraduate students (1 male and 1 female), examined their engagement with an automated corrective feedback program (Grammarly). According to the results, students involved themselves to different degrees with the automated corrective feedback program. One student demonstrated a higher level of cognitive involvement. The other showed a lower level of cognitive involvement; however, neither of the students used the automated corrective feedback program appropriately to improve their final draft.

### 3. Methodology

#### 3.1 Research design

The current study adopted a mixed approach (i.e. quantitative and qualitative). This approach accorded with the aim of the present study, and provides a more profound and comprehensive perception of the problem investigated. This study followed a pre-test, post-test experimental-control group design, and used a questionnaire survey with close-ended

#### 3.2 Participants

The study was conducted with 30 female third-year undergraduate students majoring in the English language in the Department of English at a public university in Saudi Arabia.

Participants were randomly divided into two groups: an experimental group of 15 students and a control group comprising 15 students. The experimental group was asked to use the free version of Grammarly for six weeks to check for any writing errors before submitting their assignments. Whilst participants varied in the extent to which they used Grammarly, in total, they used it almost 72 times in different assignments. In contrast, the control group did not use this program in their assignments. The participants' ages ranged from 20 to 23. All the participants had studied English as a foreign language in Saudi Arabia for almost seven years.

#### 3.3 Data collection Instruments

##### 3.3.1 Pre-test and Post-test

Both groups were given pre-essay tests to measure their English writing skills (i.e., spelling, grammar, punctuation, word choice, sentence structure, and style). The prompts



used in this research were clear and straightforward in order to motivate participants to compose; the prompts were adapted from IELTS Cambridge (2021) (see Appendix B). The writing rubric used was adapted from IELTS Cambridge (2021) to ensure the reliability and validity of the trial (see Appendix A). Both groups received different prompts in the pre- and post-tests.

Before quantifying and tabulating the results to obtain descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 25, the researcher analyzed the data using content analysis and then used an external rater to cross-validate the findings. Prior to the beginning of the actual rating procedure, both the researcher and the external rater assessed some writing samples using the same writing rubric to compare their rates and verify they had a comparable grasp of the scale's criteria. After becoming familiar with the scale's criteria, tests were rated. The writing rubric has six different scale criteria: (poor) gets a score of 1, (not bad) gets a score of 2, (fair) gets a score of 3, (good) gets a score of 4, (very good) gets a score of 5, and (excellent) gets a score of 6 depending on how well the students performed.

### 3.3.2 Questionnaire

To obtain the research data, the researcher included attitude questionnaires to measure students' perceptions of the Grammarly program. A web-based questionnaire (Google Forms) consisting of closed and open-ended questions was used (see Appendix C). The closed-ended items were adapted and modified from Parra and Calero [17], and the researcher added three open-ended questions to validate the perceptions of students.

The questionnaire initially consisted of Likert-type scale items organized around three primary characteristics: perceptions towards Grammarly in general, awareness of personal improvement in writing skills, and like or dislike of Grammarly in particular. A link was sent to students asking them to fill in the survey. The questionnaire was designed based on a five-point Likert scale, which measures respondents' interest according to their level of agreement or disagreement from 1 (strongly disagree) to 5 (strongly agree). After summarizing and tabulating the questionnaire information, data were analyzed using Statistical Package for Social Sciences (SPSS) version 25 to obtain descriptive statistics.

### 3.4. Validity and Reliability

To assess the questionnaires' validity, four specialists in Applied Linguistics and Education were asked to read every item and provide feedback on its suitability in order to assess students' perceptions of Grammarly and check for any ambiguities or complications. The researcher then added, removed, and reworded items in response to their comments. Moreover, the reliability of the questionnaire items was assessed using Cronbach's alpha, which yielded a value of 0.79, indicating that the instrument is valid.

### 3.5 Data Analysis

#### 3.5.1 Quantitative Analysis

Descriptive statistics (means and standard deviations) were utilized in the study to analyze the performance of the experimental group participants in the questionnaire, gauging their perceptions about Grammarly. Furthermore, a test was employed to analyze the variations in writing skills of both the experimental and the control groups and to highlight any significant differences between the two groups.

#### 3.5.2 Qualitative Analysis

Since close-ended questionnaires may reflect the researcher's subjective ideas, students may not have the chance to express what they actually experienced. The researcher investigated the experimental group's perceptions of Grammarly through three open-ended questionnaire items, allowing them to openly express their thoughts about their experience. This was later analyzed using content analysis.

## 4. Findings

### 4.1. Quantitative Findings

#### 4.1.1 Pre-test and post-test of the two groups

The participants' results in the pre-and post-tests are presented below.

Table 1. Descriptive statistics for pre- and post-test writing performance for both groups

Group	N	Mean	Std. Deviation	Lower	Upper
Experimental Pre-test	15	4.2667	.79881	3.00	5.00
Control Pre-test	15	4.2000	.77460	3.00	5.00
Experimental Post-test	15	5.0667	.79881	4.00	6.00
Control Post-test	15	4.4667	.83381	3.00	5.00

Test Value = 6

Based on the results obtained from the above descriptive statistics table, some primary information for each group in this study was obtained. A general examination of the table indicates no significant differences between the two groups in the pre-test (M= 4.26) for the experimental group and (M= 4.20) for the control group. For the post-tests, however, the data show there was a minor difference between the two groups. The mean for the experimental group was 5.0, and the control group was 4.46. This indicates a slight but notable improvement in the experimental group's writing skills after they used Grammarly. This improvement suggests that Grammarly had a positive effect in terms of developing their writing skills. By receiving immediate corrective feedback from Grammarly on their assignments, students corrected their writing errors prior to submission. Meanwhile, an improvement was also found in the writing skills of the control group, who did not receive any treatment, with a previous mean of 4.20 and a new mean score of 4.46. The mean scores comparison of the pre-test and post-test between the two groups is represented graphically in Figure 1.

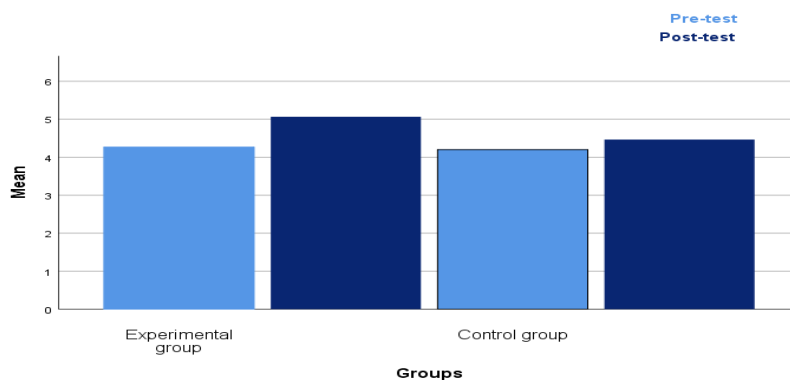


Figure 1. Comparing the means between the two groups in the pre-test and post-test

In a nutshell, based on the previous observations, there is definitive evidence that demonstrates a noticeable difference between the two groups' pre-and post-tests results. This implies that Grammarly helped students improve their writing skills by giving immediate feedback on their writing errors.

#### 4.1.2 Participants' perceptions toward Grammarly

Table 2. Descriptive statistics for participants' perceptions toward Grammarly

Items	M	SD	Total Agreement (%)	Neutrality (%)	Total Disagreement (%)
Participants' perceptions toward Grammarly.					
Grammarly error analysis of grammar is useful (e.g., wrong word, subject- verb agreement, pronoun errors, possessive errors).	4.26	.59	93.35%	6.67%	0%
Grammarly error analysis of usage is useful (word choice, prepositions, article,).	4.26	.59	93.35%	6.67%	0%
Grammarly error analysis of style is useful (e.g., passive voice, long/short sentences, repeated words).	4.26	.70	86.7%	13.3%	0%
Grammarly error analysis of organization development is useful. (e.g., how ideas are presented).	4.00	.75	46.7%	26.7%	26.6%

As shown in Table 2, participants have shown a high positive perception towards Grammarly. Most participants (93.35%) agreed that Grammarly is able to analyze grammar and usage (e.g., subject- verb agreement, word choice, prepositions, etc.) As for the Grammarly ability to analyze style (e.g., passive voice, long/short sentences, etc.), (86.7%) of the participants agreed on Grammarly capability. Interestingly, the Grammarly error analysis for organizational development received the lowest rating in the questionnaire. In total, (26.6%) of the participants refuted the statement that Grammarly was able to effectively analyze errors related to organizational development in their writing, and (26.7%) of the participants gave a neutral response. The researcher thinks that one of the reasons is that the students used the free version of Grammarly, and organizational development is more supported in the premium version.

Table 3. Awareness of personal improvement in writing skills

Items	M	SD	Total Agreement (%)	Neutrality (%)	Total Disagreement (%)
Awareness of personal improvement in writing skills					
My English writing skills have improved after using Grammarly.	4.13	.74	80%	20%	0%

In view of the awareness of personal improvement in writing skills, Table (3) shows that (80%) of the participants agreed that their writing skills had improved after using Grammarly for six weeks on their assignments, (whilst 20%) of the participants were neutral.

Table 4. Like or dislike of Grammarly

Items	M	SD	Total Agreement (%)	Neutrality (%)	Total Disagreement (%)
Like or dislike of Grammarly					
Grammarly is easy to use.	4.13	.83	73.3%	26.7%	0%
In the future, I plan to use Grammarly again.	4.40	.82	60%	28.3%	11.7%
Generally speaking, I am satisfied with Grammarly.	4.33	.72	86.7%	13.3%	0%
Total	4.22	.46			

Based on Table 4, 73.3% of participants agreed that Grammarly was easy to use, (whilst 26.7%) of the participants were neutral. Furthermore, as shown in the table, (60%) of the participants agreed on the statement "In the future, I plan to use Grammarly again", they indicated their willingness to use Grammarly again. Moreover, about (86.7%) of the participants agreed that Grammarly had mostly met their expectations.

In essence, the means range from 4.00 to 4.40, and the total mean of 4.22 (SD = .46), suggests that the participants in the experimental group had reasonably high positive perceptions towards Grammarly. As a supplement to the questionnaire survey, the qualitative findings are presented in the next section.

#### 4.2 Qualitative Findings

Content analysis was used to qualitatively examine the experimental group's written comments about their perceptions of Grammarly. Pseudonyms were used when quoting students to maintain confidentiality, and to avoid repetition; only core ideas have been cited when reporting the results. As indicated in their replies, the majority of the participants described their experience of Grammarly in positive terms, and no negative responses were reported. For example, student (1) said, "Very satisfied, it helped me to write with confidence." Students (2) and (3) added, "Good experience, I will use it again" and "Great, easy, and flexible."

Moreover, developing self-confidence was the most repeated answer when students were asked what they liked the most about their experience with Grammarly. For example, students (1) and (2) stated, "I noticed that my grammar and spelling have improved and that gave me confidence" and that "It helped me to correct myself before submitting which made me more confident." Moreover, ease at using the program was the second most reported answer. For example, student (4) said, "I like that it can be used on both computers and phones." Similarly, student (5) said, "It is easy to use with phones and computers," while students (6) and (7) added, "It's free and easy to use" and "I like that I don't need to install it on my computer, and I can open it using Google."

Furthermore, some students reported that they noticed an improvement in their writing skills. For example, student (8) said, "I like that it improved my English writing."

Likewise, participant (9) said, "It is not only about grammatical errors, but it also checks spelling mistakes.". Nevertheless, when answering what they would change about Grammarly, most students reported they wanted more features in the program, especially for content and organizational development. For example, students (10) said, "Add more features for organizational development." Likewise, students (11) and (12) added, "I want more features in the free version for content and organization" and "Add more features in the free plan.". Moreover, some students stated that they wanted the program to be completely free. Student (13) for instance stated that, "I would make the premium version free for undergraduate students." This idea was also demonstrated by students (14) and (15), who said, "I would make it all free" and "I wish the premium version was free for college students." Given the above-stated comments, we can conclude that the qualitative findings support the quantitative findings in terms of the positive perception towards Grammarly from the participants.

## 5. Discussion

### 5.1 The effect of Grammarly on EFL students' writing skills

Considering the findings of the first research question, the analysis that emerged from the post-tests showed a minor positive improvement in the experimental group's writing skills, compared with the control group, after getting immediate corrective feedback from Grammarly on their writing for six weeks. This tallies with Ranalli's [55] results, indicating that Grammarly had a positive but a limited potential to help participants improve their writing skills, since the majority of the students adopted the program as proofreading rather than a learning approach, since it provided precise fixes, requiring minimal effort on the user's side. By contrast, Lee [16], Parra and Calero [17], Qassemzadeh and Soleimani's, [28] view is incompatible with the findings of the study, as they indicated a significant improvement in the participants' writing skills after using different automated writing feedback programs including Grammarly. Some of these studies used the premium version of Grammarly, and other studies used Grammarly as a complement to teachers' feedback. Nevertheless, the improvement seen in the experimental groups' writing skills can be linked to multiple interpretations. For instance, based on the qualitative analysis, this improvement could be linked to the confidence the program gave to the students in terms of the ability to independently proofread their writing before submitting their assignments which to some extent alleviated their apprehension about writing and improved their writing skills. That is to say, participants felt more self-independent and more confident when checking their own writing errors before submission. This finding is in line with those of O'Neill and Russell [27], revealing that the students were satisfied with the confidence the program gave them to proofread their writing independently, which in turn helped them to gain higher grades. The confidence value of Grammarly was also reported by Ghufroon [56], who revealed that students appreciated the independency and confidence afforded when using Grammarly to check their English writing and assess it. Additionally, these findings corroborate the results of Khoii and Doroudian [50] which found that automated writing feedback programs aid students by enhancing their writing confidence and supporting struggling students to minimize their writing errors.

Moreover, another interpretation for the improvement found in the experimental groups' writing skills can be linked to the students' raised awareness of the errors made, as the immediate feedback allowed students to independently edit their vocabulary, grammar, spelling, and punctuation errors. That is to say, students will have a conscious understanding and awareness of their own writing mistakes. Such results match previous studies indicating that automated writing feedback programs helped to increase users' metalinguistic awareness [8],[15],[17],[19],[57].

However, the fact that no significant improvement in the experimental group writing skills was reported, could be attributed to the fact that students differed in the number of submissions they made, some students used the program for only on one or two assignments, which might have hindered their performance. This interpretation is in harmony with earlier research findings of Koltovskaia [38], indicating that students tend to involve themselves to different degrees with the automated corrective feedback program. As some students may demonstrate a higher level of cognitive involvement, and others may show a lower level of cognitive involvement. Moreover, this finding lends support to Jiang and Yu [26], indicating that the ability of automated corrective feedback programs to boost students' writing skills is individual-specific, depending on the student's motivation to learn and amount of use.

## 5.2 Participants' perceptions toward Grammarly

Considering the findings of the second research question, the analysis that emerged from the questionnaire survey revealed strong positive perceptions toward Grammarly. Most participants reported that the program had met their expectations and they were satisfied with it. These findings corroborate the ideas of earlier researchers [16],[17],[27], indicating high positive perceptions from the participants when using automated corrective feedback programs.

Moreover, based on the qualitative analysis, most participants reported that they were satisfied with the affordances and ease when using the program. This finding is in line with those of Parra and Calero [17], indicating that participants enjoyed the easiness of the program when using it. By contrast, O'Neill and Russell's [27] finding is incompatible with this study's result, as they stated that some participants were concerned about technical problems related to the program regarding uploading documents and checking errors.

Concerning participants' views on Grammarly's impact on improving their writing skills, most participants reported their satisfaction with the progress on their writing skills and indicated their willingness to use the program again. Such finding is corroborating the post-test results, which demonstrate a minor positive impact of the program on the experimental group's writing skills. The findings of the current study broadly support other related studies [8],[16],[27][28], revealing that the participants were satisfied with the progress they noticed on their writing skills after using automated corrective feedback programs. Nevertheless, most participants reported that they were satisfied with Grammarly's feedback regarding grammar, usage. Figure 2 illustrates an example of Grammarly feedback on one student's assignment regarding grammar and usage accuracy.

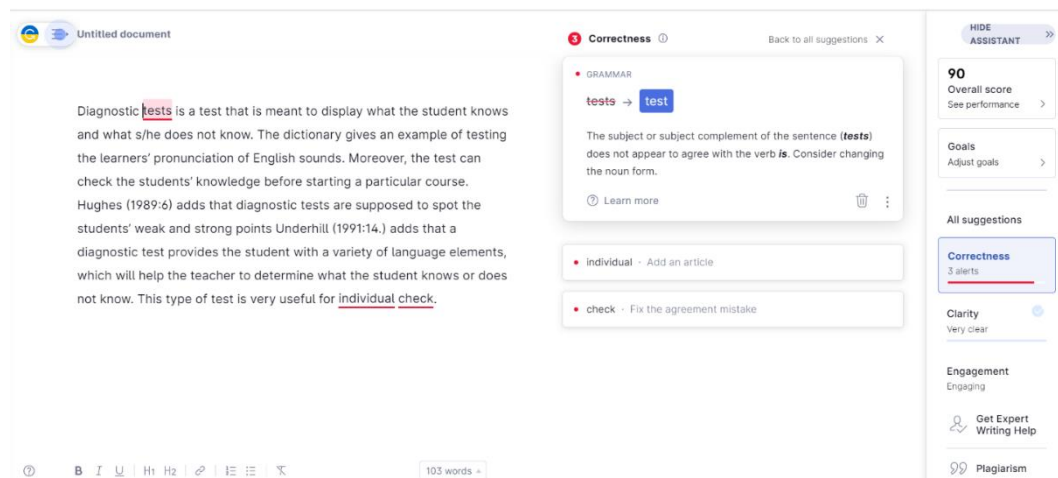


Figure 2. Grammarly Error Analysis for Grammar and Usage

As shown in Figure 2, Grammarly detected three error types associated with grammar and usage. Namely, errors found in the noun forms, errors found in the articles, and finally, errors pertaining to subject-verb agreement. Such corrective feedback, based on the qualitative findings, helped raise awareness of the errors' made and increased students' confidence when submitting their assignments.

Notably, Grammarly's feedback on content and organization gained the lowest mean score ( $M=4.00$ ) among the items on the questionnaire that measured perceptions of Grammarly's feedback. Figure 3 displays an example of Grammarly feedback on a student's assignment regarding content and organization accuracy.

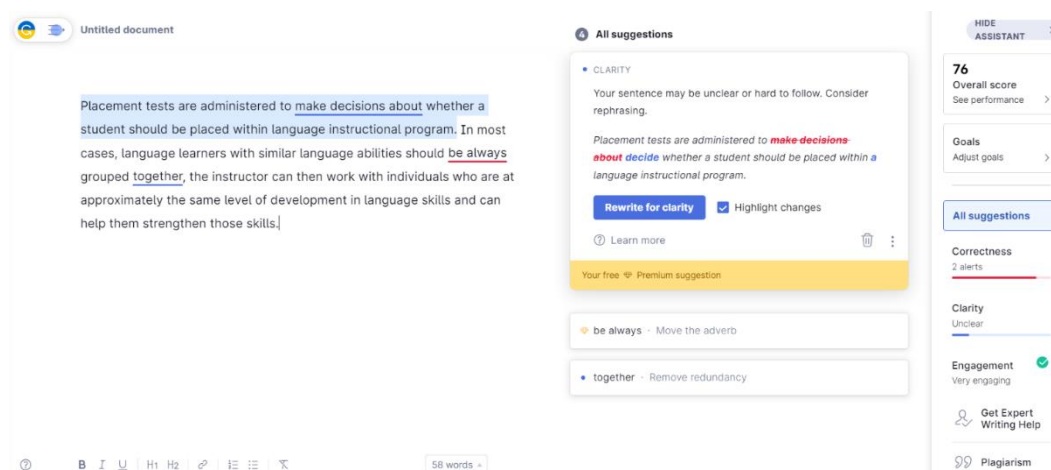


Figure 3. Grammarly Error Analysis for Content and Organization

As illustrated in Figure 3, Grammarly detected errors related to organizational development; it suggested that rephrasing the sentence would produce a more valid and clearer result. However, to receive more suggestions, Grammarly advertises its premium version. Thus, using the free version possibly affected the participants' perceptions of Grammarly's ability to analyze their errors relating to content and organization.

Such results are compatible with the results obtained by Ghufroon [56], in which Grammarly was more effective at decreasing errors in word usage, grammar, spelling, and punctuation, but not in content and organization. In contrast, corrective input from the teacher was more effective at enhancing the content, structure, and mechanics of writing. Similarly, this outcome is in harmony with that of Parra and Calero [17], in which the participants indicated that one of the program's weaknesses was its limitations on aspects of content and organization. Such findings imply that students should not fully rely on the program for error correction and feedback, and teachers' feedback remains essential. This was also supported by earlier research findings of Parra and Calero [17], indicating that students need to not rely completely on the program to get error corrections and feedback. Moreover, in discussing their study's findings, Dodigovic and Tovmasyan [20] indicated that students were able to use Grammarly as an additional tool to detect mistakes and obtain feedback; however, teacher supervision was necessary.

Taken together, it can be concluded that this study demonstrates positive perceptions toward Grammarly from the participants in terms of decreasing writing errors in grammar and usage, but not in content and organization. Moreover, most participants reported that their self-confidence increased after using the program, which helped to minimize their writing errors.

## 6. Conclusion

Based on the research findings obtained in the present study, it can be indicated that the students who used Grammarly experienced enhanced self-confidence, which helped

overcome their fear of writing and in turn improved their writing skills. Nevertheless, it was found, based on the data analysis, that Grammarly has some limitations in terms of providing correction and feedback concerning content and organization.

The research design of the present study is subject to some limitations, which are considered here. Discussion of such limitations can assist future researchers by encouraging them to avoid or ameliorate them. The first limitation here is related to the sample. The sample for this study contained 30 participants, 15 in each group, which is too small to generalize the results. Recruiting a larger number of participants was deeply desirable; however, it was not feasible since only a few participants agreed to participate in the study. Additionally, all the participants in this study were female. Owing to the fact that the researcher found it hard to contact populations from the male section; therefore, additional research is necessary to explore the effect of Grammarly on developing writing skills among males or mixed cohorts. Finally, an additional limitation that may have influenced the results relates to the time frame for the intervention. Using the program for only six weeks may have limited its impact, since some students used the program for only one or two assignments. The time allocated was beyond the researcher's control. Hence, investigating the effect of Grammarly over a longer period is worthy of further consideration.

This study contributes to the body of literature supporting the positive impact of Grammarly on developing writing skills among EFL undergraduate students. Moreover, the findings of this study could have some pedagogical implications in the field of English learning and teaching. Tackling the issue of how English writing skills can be developed, the study findings can provide some practical insights for both EFL teachers and learners.

For EFL teachers, employing Grammarly as a complementary teaching material, and asking students to use it on their assignments to get immediate feedback, can ease the burden on students on learning writing skills; since Grammarly had a demonstrably positive influence on reducing the students' fear of writing. However, based on the findings of this study, Grammarly has been criticized for the feedback provided on content and organizational development; therefore, it is suggested that both teachers and students do not entirely rely on the program for error correction and feedback. Proper instructor supervision and direction when using the tool are recommended.

Furthermore, technology has been proven in the literature that it can motivate students to become more self-dependent in their own learning and, in turn, make them more confident and improve their language learning skills [58]. Likewise, using Grammarly for EFL learners can boost their confidence in writing which helps to reduce their writing errors and develop their writing skills. Furthermore, based on the findings of this study, most participants found Grammarly easy to use, described their experience in positive terms, and indicated their willingness to use it again since they noticed an improvement in their writing skills.

To sum up, multiple questions were answered in this study. Yet, further research is required to continue investigating the impact of Grammarly on developing EFL writing skills. Future research can build on the present study by expanding the scope of the research and carrying out different directions, such as exploring the impact of Grammarly on the writing skills between EFL female and male students of different ages. Furthermore, investigating the influence of Grammarly on other English language skills would be particularly interesting. Moreover, future research should certainly further test and compare Grammarly's free and premium versions. Also, it would be very striking to explore if Grammarly has a long-term effect on English writing skills.



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