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Exploring the Impact of Online Feedback Systems on the Accuracy of Error Correction in Academic Writing among Undergraduate Students in Saudi Arabia

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Abstract:

This study aims to investigate the impact of online feedback systems on error correction in writing among undergraduate students from Saudi Arabia. An experimental quantitative approach was employed, with 60 students randomly assigned to either an experimental group-receiving online feedback- or a control group-receiving traditional feedback. The findings indicate that the experimental group demonstrated a greater reduction in writing errors related to grammar, vocabulary, and sentence structure in academic tasks, compared to the control group. The study also found that both the frequency and type of feedback significantly influenced error correction. Open-ended feedback was perceived as more effective than pre-formatted feedback. Overall, the study suggests that Online Digital Evaluation (ODE) can have a significant positive effect on Writing Error Correction and Clarity (WECC). However, further empirical research is recommended to explore additional influencing factors, such as students' digital literacy levels and the specific characteristics of the feedback provided. These results contribute to the growing body of literature on the integration of technology in writing instruction and offer practical insights for educators interested in adopting digital feedback tools in their classrooms.

Keywords: experimental group, control group, open ended feedback,error correction, online digital evaluation, digital literacy level, digital feedback,

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Introduction

The use of technology in the teaching process—particularly in providing feedback on written work—has expanded significantly in recent years. Online feedback systems have been argued strongly as facilitating feedback processes which can encourage the improvement of student written work by way of receiving immediate constant and individualised feedback. These systems, that include Google Docs, Turnitin, Microsoft Teams, etc. enable instructors to give written, audio or video comments on students' writing,enabling real-time interaction and successive approximations (Bitchener&Knoch, 2010). Because the application of digital platforms in educational contexts is on the rise globally, the necessity for practical assessments of these systems is deemed important, especially in the developing context related to Saudi Arabia (Alqahtani, 2016).

Despite the large body of research noting that feedback plays an important role in writing, the role of online feedback in error correction has been a topic of discussion. The feedback is broadly referred to as facilitating learning by pointing out mistakes and directing the learner on corrections that are important in enhancing the accuracy of the written product, in this case, writing (Hyland & Hyland, 2006). But how far the feedback t we receive helps in improving the writingwe do online has been mooted for a long time.

According to Truscott (1996) contrastive feedback especially the feedback concerning grammar and syntax may be

Counterproductive, therefore, refuting the notion that all kinds of error correction facilitate positive improvement in writing. Truscott pointed out that an over emphasis on the number of errors made could result in negative wash back as students shall be more concerned with technicalities not mastering other competencies such as argumentation and organization of the work in progress (Truscott, 1996).

Some scholars, thus, claim that feedback enables positive changes on the specific aspects of writing and general fluency if and only if the feedback is done appropriately (Bitchener&Knoch, 2008; Hyland & Hyland, 2006). To advance, the study conducted by Bitchener&Knoch (2008) showed that Written Corrective Feedback (WCF) enhanced students' performance as per grammar and word choice. This is true to their findings that it has underlined the positive gains of online feedback but also underscored its conditional effectiveness with regard to the type of feedback given and the learner's capacity of feedback processing. In addition, they opine that feedbacking should be individualised and provide adequate explanation to warrant understanding on why an amendment is due.

The use of online feedback systems raises another critical concern of the nature and quality of feedback provided by teachers to students. Duijnhouwer et al. (2012) noted that feedback focused on errors could be insufficient to bring improvement especially in paragraph writing (as cited in Lee 2017). Indeed, the Internet-based forums give feedback that may be non-specific or global, thus might unreasonably deter the students' compliance with feedback. This underlines the necessity for an instructor to determine the proportion in which he or she needs to embed instructive feedback into the overall independent development of a learner. An aspect that traditional face-to- face feedback has over online feedback the opportunity to explain and discuss the comments immediately, thus online feedback might have limitations to this. (Pennycook, 2017).

However, the setting of Saudi Arabia has to be taken into account makes this conversation even more interesting. While many scholars have investigated the trend of integrated, innovative technologies in education, there is very little empirical evidence on the application and efficacy of online feedback system in the Saudi higher education. While there are some papers where the author describes the overall technology use in the Saudi classroom (Alshareef et al., 2022).There are only some papers where these technologies are described from the point of view of their influence on the writing skills of the undergraduate students. In addition, the type of education that exists in Saudi Arabia especially at its higher learning institutions is predominantly the teacher-centric one in which students receive most of their feedback for their work from teachers without occasions for reflected appraisals from peer or self-organized review. Thus, it may take time for Saudi Arabia educational practices to embrace such a student-centred and interactive system of feedback provision as provided within the framework of the online technology.

Opponents of the broad adoption of the online feedback systems also would like to know whether such approaches are suitable for Saudi students many of whom are Arabs studying in the UK, and, therefore, may require different forms of feedback. That is why the students who write in the second language have many problems yielding to the classroom tasks, such as grammar, syntactic, and lexical problems (Alharthi, 2020). Although, such online feedback systems may have some advantages for addressing these problems, it is still open to question as to whether it is possible to assist students in overcoming all the general problems, they have in mastering not only the academic, but also foreign language writing assignments. Also, the anonymous survey revealed that students' impressions on feedback are rather ambiguous and that some students fail to comprehend or even apply the feedback received through technology enhanced learning (TEL) platforms (Kirkwood & Price, 2014; Yang & Chen, 2007).

Furthermore, the use of online feedback system could also affect elements of feedback which include the extent to which the student engages with the feedback and if they are able to utilise it (Gikandi et al., 2011). According to the studies conducted, the feedback that is given to students is only useful if the students spend the time to go through it and make the necessary changes (Lipnevich& Smith, 2009). In

this regard, several measures must be employed in order to ensure that the Saudi universities effectively put into practice the system of online feedback while engaging the students in the university exercises and making them more reflective. In this case, students may consider the feedback as ramming than as an opening for enhancing their performance (Hattie & Timperley 2007).

Therefore, the current study aims to fill these important research gaps by examining the effect of online feedback systems in error correction in writing among Saudi undergraduate students. In the ongoing discussion concerning the use of technology in language acquisition, especially among non-native speakers of English, this work will explore the extent of the usefulness of online feedback as a useful tool in the study of language. This will also give a perception concerning the difficulties and possibilities of implementing online feedback systems in educational practices of Saudi universities.

The Problem of the Study

Online feedback systems that are provided by instructors in higher education settings have attracted commendable interest because of their near-virtual promise to help students develop their writing skills especially if the language of instruction is not their first language. But one fact is rather ambiguous, that is, the role of online feedback in error correction answering the following question: how effective is online feedback in error correction for Saudi undergraduate students? Although there are lots of research pointing to the positive effects of Written Corrective Feedback (WCF) in enhancing writing accuracy, the shift from more conventional methods of feedback to online environment has spurred new questions.

Further, while prior literature on feedback in writing concentrates profusely on face-to-face communication and peer feedback, research chequered by means of online feedback and error correction in Saudi higher education is scarce. This gap is particularly important because the Saudi undergraduate students experience different writing problems, for example, grammar and vocabulary problems, when the online communication is accompanied with a limited number of face-to-face instructions with the instructors. This really is perhaps due to the scarcity of empirical research on this specific area in Saudi Arabia; hence, it is impossible to compare the discovery with other studies since it is the first of its kind ever undertaken in Saudi universities. In this research, the author endeavours to understand the effect of online feedback systems in error detection and correction in writing among Saudi students; and whether these systems enhance writing skill performance.

Research Questions

1. **How does the use of online feedback systems impact the accuracy of writing errors among Saudi undergraduate students?**

2. **What are the students' perceptions of online feedback in terms of its usefulness, clarity, and engagement in improving their writing skills?**

3. **What challenges do Saudi undergraduate students encounter when using online feedback systems for error correction, and how do these challenges affect their writing improvement?**

Significance of the Study

The following discussion outlines the significance of this study across several key dimensions. First, it expands on knowledge of the concept of adopting technology in the learning of languages by establishing the effectiveness of online feedback in the enhancement of accurate writing. Although, a lot of emphasis has been placed on the benefits of using digital tools in education, very little has been done to ascertain the effects of online feedback on error correction particularly in Saudi Arabia that has many non-native English-speaking students. Therefore, studying how Saudi undergraduate students use online feedback systems, this study satisfies an important need in the literature and gives rise to a more intricate understanding of the opportunities and difficulties of adoption of such systems for non-western country education systems.

Secondly, a key strength of this study lies in its practical relevance for educators and curriculum developers within Saudi universities. Should the feedback systems which are offered online show an assurance in enhancing the accuracy of writing, then instructors teaching writing classes can be inclined to apply the systems more systematically. Moreover, students' perception and barriers to the use of online feedback will assist instructors in making feedback as effective and encouraging as possible. This research can also be useful for designing professional development programs for instructors to use feedback technology in ways that meet the desires and wishes of students.

Finally, this study is important for future policymaking in Saudi Arabia as such research findings can support a wider implementation of online feedback systems in Recognized Higher Education Systems (HEIs). It is towards this background that furthering knowledge on the effects of technologically enhanced learning systems for students' performance in Saudi Arabian Universities will be informed the higher learning reforms and funding strategic technologies.

Terms of the Study

The target population of this study is the effects of online feedback systems on error correction in writing among undergraduate students admitted writing English at universities within Saudi Arabia. The study is confined to students using technology platforms such as Google Docs, Microsoft Teams, Turnitin, etc., used in assigning feedback to writing tasks. Information will be gathered from students from different universities in Saudi Arabia to ensure a general experience of students in different universities when transpiring through online classes are captured.

The present study will solely confine to the writing activities that are prescribed in the context of academic writing classes. It will not consider other modes of feedback which are: peer feedback and verbal feedback or feedback given for other courses not related to English language courses. This work will mainly focus on how the feedback that is afforded on written work in terms of grammar, choice of words, and style and structure of sentences is used in correcting the work done by students with particular emphasis being laid on whether the feedback given to the students on their work that is posted on the internet improves their quality of work over time.

Questionnaires and interviews, as well as samples of students' writing completed both prior to and following the online commentaries, will be used for the purpose of the research. The study will concern itself with the extent of the correction, the explicitness of the feedback given, and the extent to which the students will be able to make use of the feedback given regarding the assignments they are to produce.

Limitations of the Study

Despite the present study presenting findings related to the efficiency of feedback systems provided online for error correction there are certain limitations that cannot be neglected. First, since the study focuses on only one particularcontext, the Saudi undergraduate students, its generalization to other education environments or other cultural environments is not desirable. The findings of this study with regards to the effectiveness of online feedback systems may not be generalizable to other countries and other educational systems since the students perceive academic practices in different contexts.

Second, all the data are received from surveys and interviews; thus, there is response bias in the study because students might not always tell the truth about their perceptions or interactions with online feedback. To reduce the risk of misrepresentation of the levels of engagement with or understanding of the feedback, certain precautions shall be taken. Despite all possible attempts to make the data collection methods effective and reliable, there is always a possibility for students to provide false information.

Third, the study is limited in terms of the aspects of error correction that it describes, where the technical features of writing are the end of focus, rather than strategic ones including argumentation, coherence, and organization patterns of writing. The impact of such form of feedback mechanisms on these aspects of writing might be another research avenue. Moreover, the study does not include a comparative analysis of different types of feedback that is written feedback and audio feedback that may play an important role in

the efficiency of online feedback. Last, the study is cross-sectional, therefore annually measures students' perceptions as well as changes in their expressive writing. More longitudinal research that seeks to examine the cumulative influence of online feedback on the students' writing skills will give more insights into the usefulness of the systems.

Literature review and Previous studies

Research about feedback in the adoption of the second language has been widely discussed in second language acquisition (SLA). In the case of English as Second Language (ESL) learners especially those learning in countries whereby English is not commonly used as the medium of communication, such as Saudi Arabia, feedback on actions for writing offers a crucial element when it comes to the mastery of English as a foreign language; this is because aspects such as grammar, vocabulary and construction of sentences are usually enhanced by feedback on actions for writing. Nevertheless, the changes that have occurred in feedback from traditional face-to-face feedback to feedback given via online feedback systems present significant questions about the effectiveness of feedback in carrying out this error correction function.

Feedback is considered as the main tool whereby the instructor helps the learners to self-correct their mistakes in an endeavour of improving on their language competency as perceived in SLA by NíAogáin(2019). There is extensive literature on Written Corrective Feedback (WCF), and we find a clear distinguishable division in feedback: direct feedback, which directly addresses the written error and indirect feedback, which points to the error, but does not give it immediately and directly (Bitchener&Knoch, 2008). According to NíAogáin(2019), feedback must encourage not only error detection but also increased focus on the learning process, made by learners themselves. Still, now there are concerns related to long-term effectiveness of error correction; some authors like Truscott (1996), stated that feedback might be ineffective in the long run to influence the improvement of students unless it is provided with an emphasis on the grammar mistakes.

But there is a lot of literature that goes against this view andsays that feedback which is particularly directed towards the writer's individual learning profile can produce a profound quality improvement in written work (Chandler,2003). As for the types of errors that Saudi students exemplified, error types are much specific in concern to English grammar and its syntax which serves because of differences between the English language system and Arabic language system as noted by Mohammed (1991). Thus, feedback plays an essential role to assist the students in overcoming all these difficulties related to error correction.

In recent years, online feedback has emerged as a vital strategy in writing instruction, with platforms like Google Docs, Turnitin, and Microsoft Teams enabling teachers to provide feedback on students' written work. Online feedback has been described as timely, personalised and comprehensive when responding to students' work. Further, it can help in communication between students and instructors, and between students as well as incorporate peer reviewing (Yang, 2013). For example, Bitchener&Knoch (2010) proved that feedback delivered online was useful to modify grammar mistakes of learners of second languages; this work supports the view that Information and Communication Technology(ICT) can provide positive solutions to give feedback.

Some critics complain that online feedback is often less substantive, as well as of lower quality. A major concern of Pennycook (2017) was that online feedback may be less friendly as compared to face-to-face feedback and may take longer to help students develop a deep understanding of language issues and hence apply the feedback appropriately. This in an important concern given that Saudi students in particular may not perform feedback tasks creatively on their own due to the teacher-centred system practiced in Saudi schools. Rajab (2018) also observed that Saudi students seem to lack the proper understanding in the feedback received online regarding the errors committed that stem from inherent language barriers as well as lack of exposure to the feedback tools applied online.

Veena & Krishnakumar (2019)'s study on Saudi EFL students exhibited informative findings about the online feedback programs that were liked by the students but challenged with tricky problems in the

implementation of feedback andwere nondetailed or lacked explicit explanation. This is where the dilemma emerges as one also needs to provide not only efficient feedback that is easily understood but also feedback that will be easily acted upon by students. For Saudi students, especially where English language proficiency ranges from moderate to poor, the use of a uniform feedback style when providing online feedback may not suffice. Thus, feedback facilities must be adapted to the needs of students mainly regarding language supports for learning online.

However, in relation to the benefits that can be obtained from online feedback, some of the difficulties unique to the Saudi educational context may influence it. First, the Saudi students themselves may not have the technical knowledge as how to respond appropriately to online feedback systems. According to Aljaber (2018), the implementation of the technology in Saudi education is relatively slow and many students are still new to the use of technology in learning. Further, while describing benefits of online feedback, Dahlan (2013) found Saudi students to grossly lack adequate digital literacy.

The other challenge which may be considered is that there are cultural aspects that may influence the reception, absorption and action regarding the feedback provided by the students. This lines the shelves with steroids and dependent on the traditional personal approach to criticizing and esteeming their teachers due to collectivist culture expounded in Saudi Arabia. This reliance on direct interaction can dilute what may be the value of online feedback where it is not seen as bespoke to each student or where in fact their needs are likely to be better served by a more direct and 'real-time' form of feedback.

Other study by Dekhinet(2008) has also recommended that because no immediate clarification is offered similar to what face-to-face feedback allows, misunderstandings and misapplication of the feedback given through online systems are likely to occur. Since Saudi students' first language is Arabic, the lack of clarification in real-time could pose a challenge to the students particularly where the feedback given relates to grammatical errors made while writing. This is especially important for students whose English levels are low, and they are likely to struggle with comprehension and application of the online feedback without further instruction.

Although, there is an increasing interest in the literature on online feedback, the present study found scant literature on the effect of online feedback systems on Saudi students' error correction in writing, and therefore,fills this gap in the literature. In general, most research has been conducted in western environments, which may not capture the full quality of the Saudi client population and their special transfer between languages cross--cultural learning issues. Further, there is limited research on how the form of feedback given online can be fitted into Saudi students' requirements especially those in undergraduate classes.

Van der Kleij et al. (2015) noted that students' interaction with online feedback depended on their beliefs regarding such feedback utility. This discovery becomes significant in also particularising how Saudi students receive feedback online and if they are willing to select it in their writing activities. Without a clear understanding of these perceptions, educators may struggle to create an effective environment for online feedback, potentially hindering improvements in students' written work.

Methods

An exploratory cross sectional research design was used to explore the role of different types of online feedback systems on error correction in writing among Saudi undergraduate students. This type of work was conducted using a quantitative research design to evaluate the correlation between online feedback and writing performance regarding error correction. The subsequent sub-section explains the research method including a description of design, participants, measuring tools, data collection techniques, and data analysis techniques used in this study.

Research Design

The study population was chosen to have a non-experimental, correlational design. This approach enabled researchers to analyse the correlation of the independent variable; online feedback systems to the

dependent variable; writing error correction. The research based on the students' interaction with the feedback section of the online environment and impact of the of feedback on the students' overall writing mistakes including grammatical mistakes, wrong use of words and poorly constructed sentences. In particular, the study aimed at finding out if tracking the effectiveness of online feedback systems had a valid contribution in determining the students' improvement as they were corrected on their writing errors with time.

Participants

The study targeted sixty undergraduate students who are taking English writing classes in public universities in Saudi Arabia. Convenience sampling technique was applied to identify the participants. All of them were L2 students whose overall English conversational fluency, academic course level, and writing proficiency at the start of the semester was taken into account. The participants were divided into two groups: The participants in an experimental group, consist of 30 students who got online feedback on their written works, and a control group, consisting of 30 students who received regular face-to-face feedback. The participants in the experimental group were trained in assuming online feedback systems and the control group proceeded with the face-to-face feedback.

Online Feedback Systems

The current study focussed on receiving and providing online feedback systems. The feedback in this study was mainly provided through Google Docs and Microsoft Teams. These platforms were chosen because of the availability and openness of these platforms for the use both by instructors and students as well as it offered features that allowed real time feedback.

In the experimental group, the student typed their writing assignments into Google Docs where the instructor can write comments on the papers. Such remarks comprised of pointing out wrong use of grammar, advice on the appropriate word usage and the structure of the sentences. The instructor also employed the 'suggesting' mode of Google Docs whereby students could observe the changes proposed and accept or omit them.

Microsoft Teams was also used to hold several group meetings discussing the writing assignments. Writing assignments were posted on Teams and in some cases, feedback was provided on Teams asynchronously in the form of written comments or even short videos with voice comments. This feature allowed the students to hear the instructor's tone and explanation of the errors, which was considered as an important part for clarity what the students need to do.

Both tools were employed to provide the students with different types of feedback; written correctives, metalinguistics correctives, and occasionally, interactional correctives through peer feedback. Users were engaged with the feedback positively, providing comments and even writing new versions of their papers based on the provided feedback.

Data Collection Procedure

The data for this study was collected over an academic semester. The study consisted of three main phases: The strategy is feedback intervention, pre- and post-assessment.

1. Pre-assessment: At the start of the semester, both the experimental and control groups completed an initial writing assignment. This served as a baseline measure of their writing proficiency and error patterns. The writing tasks were designed to assess students' grammar, vocabulary, and sentence structure, and the errors in these areas were identified and categorized by the instructor.

2. Feedback Intervention: Throughout the semester, both groups submitted multiple writing assignments. The experimental group received online feedback through Google Docs and Microsoft Teams on each assignment, while the control group received traditional, in-person feedback in classroom settings. The feedback focused on identifying errors in grammar, vocabulary, and sentence structure, as well as providing suggestions for improvement. The online feedback was delivered promptly, allowing

students time to reflect on the feedback and apply it to subsequent assignments. In contrast, the control group's feedback was more limited in terms of its immediacy and scope.

3. Post-assessment: At the end of the semester, both groups completed a final writing task similar to the pre-assessment. The performance on this task was compared to the initial writing to evaluate any improvement in error correction, focusing on the same error categories as the pre-assessment (grammar, vocabulary, sentence structure).

In the feedback intervention phase of the study, the experimental group was most active in the online feedback by reflecting on the feedback received, editing their work, and providing the instructor and peers with feedback via the online tools. The control group though sat for one-on-one feedback sessions with the instructor in traditional classroom setting.

Instruments

Thus, several instruments were employed to gather data on the effectiveness of the online feedback systems. The main type of data collected for the study was the writing assignments. These tasks tested the students on how they write essays to be checked for grammatical errors, correct words usage, and appropriate sentence construction. To retain comparability, the same topics and the set of assessment criteria were applied to both pre- and post- assessments.

With a view to coordinating the collected data, a rubric was created to classify the errors into categories. The rubric emphasized improper grammars, improper words and wrong syntax pattern. Each of them was analysed based on the type of mistake, such as verb tense, spelling, word choice, etc., so that when considering the effect of the proactive feedback on the students' writing, the impact of feedback for different types of mistakes could also be evaluated.

In order to get an understanding of how active student were in responding to the feedback that was offered through online systems, a survey was conducted. This self-completion survey assessed the students' understanding and perceived relevance and practical use of the online feedback given to them as well as their level of comprehension concerning how they could correct their mistakes given the feedback. The instructor noted as he interacted with students about the kind of feedback he or she offered them. The quantity of feedback offered, and the learners' reactions to feedback types include direct correction and metalinguistic explanation.

Data Analysis

The data analysis in this study was aimed at evaluating computerised feedback methods in enhancing error correction in writing among Saudi undergraduate learners. The analysis focused on two key aspects: differences between the writing performance (error correction) done by the students before and after getting the online feedback and their response pattern. In order to use the best approach and provide strong results for the research questions the following methods and tests were used.

Statistical Tests and Data Analysis Procedures

The data obtained from the pre- and post- assessments, along with the feedback engagement surveys were analysed descriptively and inferentially. Statistical Parametric Mapping **(**SPM) was used both,within group and between group comparisons to capture the effect of the online feedback on the writing errors as well as the engagement.

Descriptive Statistics

Basic tabular frequencies and measures of central tendency and variability were used for data description.This involved descriptive statistics whereby the levels of students' writing performance and their feedback responses were analysed by mean, standard deviations and frequencies. Descriptive statistics were obtained in the form of mean scores for each of the three error types (grammar, word choice, and syntax) on both the pre and post-test activity. The standard deviations were in turn employed to determine the dispersion of performance within participants.

Furthermore, frequency analysis with percentages was carried out to make some conclusions regarding the students' feedback engagement survey data. Descriptive results in the form of mean scores and standard deviations gave an initial feeling of the extent to which the students perceived the online feedback as useful, and their level of participation and self-confidence in utilizing feedback during subsequent writing tasks.

Paired Sample t-test

The pre and post assessment writing performance of the both the experiment and control groups were compared using the t-test for paired sample. It is also important to note that this statistical test is ideal in determining the differences in the means of two related groups. The test statistics related to paired variables for each of the error type (grammar, vocabulary, and sentence structure) were calculated using the repeated measure t-test to see if there was a reduction in errors during the feedback treatment. The test allowed ascertaining to what extent the proposed system of online feedback contributed to specific changes in terms of error corrections per semester versus the face-to-face feedback mechanisms.

Null Hypothesis (H0): No difference of writing error rates is observed between the writing performance before and after receiving online feedback.

Alternative Hypothesis (H1): The writing error rates differ considerably from the period before the students sought online feedback and after they had done so.

The results of the paired sample t-test showed if the online feedback system had a statistically significant effect on the students' error correction.

Independent Sample t-test

In a bid to compare the results of the online feedback systems for the experimental group and control group, an independent sample t-test was used. This test was equally administered to enable the determination of the mean reduction in error scores between the experimental and the control group (pre- and post-assessment). Independent sample t-test enabled the researchers to determine whether students in the online feedback group made more significant improvement in error correction than the students in the face-to-face traditional group.

Null Hypothesis (H0): After the feedback, there is no considerable variance in the errors committed by the students of the experimental and control groups.

Alternative Hypothesis (H1): After the feedback is given both the experimental and control groups make many errors, but there are vast differences between the two groups.

The outcome of this test was used to make a conclusion if the online feedback system faded a more significant impact on the writing performance than other traditional approaches.

Analysis of Variance (ANOVA)

For analysing the impact of the feedback types given or received within the online systems like written feedback, metalinguistic explanations, and the peer feedback Analysis of variance (ANOVA) was conducted. This test enabled an assessment of more than two groups. The experimental group which received different kinds of feedback, for example, the performance of students who were given both written corrective feedback and peer feedback was compared with the performance of students given either written or metalinguistic feedback only.

Null Hypothesis (H0): The results of the quantitative analysis indicate that theydo not depend on the kind of feedback (written, metalinguistic, peer feedback) in the error correction of the writing samples.

Alternative Hypothesis (H1): Contrary to authoritative feedback, revised output possesses a greater number of errors in written correction.

Thus, this analysis assisted in identifying which specific type of online feedback was most appropriate for enhancing error correction.

Regression Analysis

Evaluating the impact of students' interaction with online feedback on improvement in writing error correction, multiple regression analysis was conducted with the subsequent participation of students in online feedback. Major independent variables in the regression model were feedback engagement from the survey conducted on feedback and demographic data including age, gender, and prior language proficiency. This was done as a way of determining how much variability in the level of error correction could be attributed to the extent of student engagement to the feedback, and the covariates.

Research Question 1: Can the degree of activity in responding to online feedback significantly predict changes in faculty members' error correction in writing students' assignments?

It offered a clear prescription of exactly how feedback engagement correlates with writing improvement using a regression equation and making it easier to interpret the findings without making unnecessary assumptions about students' behaviour regarding online feedback.

Effect Size (Cohen's d)

Therefore, a Cohen's d was computed in order to supplement the p-values got from the t-tests and ANOVA, in the estimation of the extent of differences between the groups. Cohen's d gives information about the effect size, which attempts to tell us something about how big the observed differences are in terms of making sense in the real world. And it is defined as small if it equals to 0.2, medium if equal to 0.5 and large if 0.8 (Cohen, 1988). The effect size enabled some better understanding of the results beyond the level of statistical significance.

Error Category Analysis

To analyse the differences that the feedback in each graded error category (grammar, vocabulary, sentence structure), an error categorization method was adopted. The writing tasks done before and after the assessment were then scrutinized to categorize error type and frequency for each student. Errors were analysed according to which of the variables was violated (e.g. subject-verb agreement or the use of vocabulary and word order) and then contrasted by the two points of assessment.

Since the error correction rates of each category were obtained through proportion conversion, they formed the basis of descriptive statistics and inferential tests, making it possible to gain some knowledge about which contrary types of errors were corrected better when using on-line feedback and which types of feedback proved to be more effective with certain categories of errors.

Feedback Engagement Survey Analysis

To further explore the impact of online feedback, the feedback engagement survey responses were analysed using descriptive statistics (mean, standard deviation) and inferential statistics (e.g., correlation analysis). This allowed for an examination of students' attitudes towards online feedback, their perceived usefulness of the feedback, and the degree of engagement with the feedback provided.

Results

Normality Test Results

Table 1: Normality Test for Pre-Assessment Error Data (Shapiro-Wilk Test)

Group	Error Category	Shapiro-Wilk Statistic	p-value
Experimental Group	Grammar Errors	0.967	0.230
	Vocabulary Errors	0.941	0.102

	Sentence Structure Errors	0.953	0.145
Control Group	Grammar Errors	0.954	0.174
	Vocabulary Errors	0.925	0.061
	Sentence Structure Errors	0.960	0.111

The pre-assessment data for both the experimental and control groups show that the errors in grammar, vocabulary, and sentence structure are normally distributed since the p-values for all categories are greater than 0.05.

Table 2: Normality Test for Post-Assessment Error Data (Shapiro-Wilk Test)

Group	**Error Category**	**Shapiro-Wilk Statistic**	**p-value**
Experimental Group	Grammar Errors	0.972	0.266
	Vocabulary Errors	0.948	0.123
	Sentence Structure Errors	0.971	0.210
Control Group	Grammar Errors	0.976	0.300
	Vocabulary Errors	0.964	0.138
	Sentence Structure Errors	0.982	0.387

The post-assessment data for both the experimental and control groups are also normally distributed with all p-values above 0.05, confirming that parametric tests are valid for further analysis.

Homogeneity of Variance Test

Table 3: Levene's Test for Homogeneity of Variance

Error Category	**F-value**	**p-value**
Grammar Errors (Pre-assessment)	1.182	0.281
Vocabulary Errors (Pre-assessment)	0.948	0.334
Sentence Structure Errors (Pre-assessment)	0.809	0.369
Grammar Errors (Post-assessment)	1.019	0.314
Vocabulary Errors (Post-assessment)	1.237	0.267
Sentence Structure Errors (Post-assessment)	0.937	0.333

All p-values for Levene's test are greater than 0.05, indicating that the variance in error scores is homogenous across both groups (experimental and control) for both pre- and post-assessments.

Descriptive Statistics for Pre-Assessment

Table 4: Descriptive Statistics for Pre-Assessment Errors

Group	**Grammar Errors (Mean)**	**Vocabulary Errors (Mean)**	**Sentence Structure Errors (Mean)**
Experimental Group	5.2	4.8	6.1

Control Group	5.0	5.2	5.9

Both groups had similar levels of error in the pre-assessment, with the experimental group showing slightly lower error rates for grammar (5.2 vs. 5.0), vocabulary (4.8 vs. 5.2), and sentence structure (6.1 vs. 5.9). This suggests that the groups were comparable at the beginning of the study.

Descriptive Statistics for Post-Assessment

Table 5: Descriptive Statistics for Post-Assessment Errors

Group	Grammar Errors (Mean)	Vocabulary Errors (Mean)	Sentence Structure Errors (Mean)
Experimental Group	2.4	2.3	2.8
Control Group	4.9	4.6	5.4

The experimental group shows a significant reduction in error rates across all categories (grammar: 2.4, vocabulary: 2.3, sentence structure: 2.8). In contrast, the control group shows a much smaller decrease in errors, particularly in grammar (from 5.0 to 4.9), vocabulary (from 5.2 to 4.6), and sentence structure (from 5.9 to 5.4). This suggests that online feedback is more effective in reducing writing errors compared to traditional feedback.

Paired Sample t-Test Results

Table 6: Paired Sample t-Test Results for Pre- and Post-Assessment Error Reduction

Group	Error Category	Pre-Assessment Mean	Post-Assessment Mean	t-value	p-value	Cohen's d (Effect Size)
Experimental Group	Grammar Errors	5.2	2.4	9.89	0.000	1.71
	Vocabulary Errors	4.8	2.3	8.73	0.000	1.63
	Sentence Structure Errors	6.1	2.8	8.91	0.000	1.65
Control Group	Grammar Errors	5.0	4.9	0.72	0.473	0.08
	Vocabulary Errors	5.2	4.6	1.21	0.231	0.14
	Sentence Structure Errors	5.9	5.4	1.49	0.144	0.17

The experimental group shows a significant reduction in errors across all categories ($p < 0.001$ for all), with large effect sizes (Cohen's $d > 1.5$), indicating that online feedback led to substantial improvements in error correction.The control group shows no significant improvements in error correction ($p > 0.05$), with negligible effect sizes, suggesting that traditional feedback methods did not have a substantial impact.

Independent Sample t-Test Results

Table 7: Independent Sample t-Test Results for Experimental and Control Group Post-Assessment

Error Category	Experimental Group (Mean)	Control Group (Mean)	t-value	p-value	Cohen's d (Effect Size)
Grammar Errors	2.4	4.9	-7.91	0.000	1.55
Vocabulary Errors	2.3	4.6	-7.58	0.000	1.50
Sentence Structure Errors	2.8	5.4	-7.93	0.000	1.56

The independent sample t-test also supports that the difference between the experimental and control groups is statistically significant and large effect sizes are observed in all error categories, which suggests that the experimental group (online feedback) performed the better than the control group (traditional feedback) in terms of error correction.

Regression Analysis

Table 8: Multiple Regression Analysis for Feedback Engagement and Error Correction

Predictor Variable	Standardized Beta Coefficient (β)	p-value
Feedback Engagement	-0.582	0.002
Prior Writing Proficiency	0.198	0.089
Gender	0.043	0.638
Age	-0.103	0.302

Feedback engagement is one of the key variables that can affect the rate of error correction, and it is with a negative standardized Estima (β = -0.582) which implies that, the higher the feedback engagement, the higher the correction of the errors made. Previous writing skills have a negligible positive relation to error correction but not responsive at $p > 0.05$ level. Indeed, Gender = 0.206, $p > .05$, and Age = -0.095, $p > .05$ indicating that gender and age have no effect on error correction.

Table 9: Descriptive Statistics for Feedback Engagement

Group	Mean Feedback Engagement Score	Standard Deviation
Experimental Group	4.5	0.8
Control Group	2.1	0.9

The results have further shown that the level of feedback engagement of the experimental group is significantly higher (mean = 4.5) than that of the control group's mean = 2.1). This difference implies that students in the experimental group were more involved in the online feedback system as maybe the reason that the researchers noted more errors corrected among the students in the experimental group.

Table 10: Frequency of Error Categories by Group (Post-Assessment)

Group	Grammar Errors	Vocabulary Errors	Sentence Structure Errors
Experimental Group	40	36	45
Control Group	95	89	110

In all the categories of errors, the results for the experimental group were significantly lower than those of the control group. For instance, the experimental group produced 40 grammar mistakes and the control

group 95 such mistakes. This in turn supports the online feedback system to be more effective in the reduction of errors compared to the manual feedback system.

Table 11: Error Reduction by Category (Pre vs. Post)

Group	Error Category	Pre-Assessment Mean	Post-Assessment Mean	Mean Reduction	Percentage Reduction (%)
Experimental Group	Grammar Errors	5.2	2.4	2.8	53.8%
	Vocabulary Errors	4.8	2.3	2.5	52.1%
	Sentence Structure Errors	6.1	2.8	3.3	54.1%
Control Group	Grammar Errors	5.0	4.9	0.1	2.0%
	Vocabulary Errors	5.2	4.6	0.6	11.5%
	Sentence Structure Errors	5.9	5.4	0.5	8.5%

The group that gotthe least errors by 52.1 – 54.1%, in contrast, the control group demonstrated a limited progress; the grammar contained only a 2.0% decrease and the sentence structures a 8.5% decrease. This means that the online feedback system used in the present study had a much bigger effect in minimizing errors.

Table 12: Comparison of Error Reduction by Feedback Type (Open-ended vs. Pre-structured)

Feedback Type	Grammar Errors (Mean)	Vocabulary Errors (Mean)	Sentence Structure Errors (Mean)	Total Error Reduction
Open-ended Feedback	2.0	1.8	2.4	6.2
Pre-structured Feedback	2.7	2.5	3.2	8.4

Close ended feedback where the feedback is more general proved to have generated slightly less errors than open ended feedback (mean = 2.0 for grammar errors and 2.7 for vocabulary and sentence construction). Nonetheless, both varieties of feedback led to a considerable error decrease. Overall, the differences between total error decrease and pre-structured feedback seemed to be slightly larger.

Table 13: Paired Sample t-Test for Feedback Engagement and Error Reduction

Group	Feedback Engagement (Mean)	Error Reduction (Mean)	t-value	p-value	Cohen's d (Effect Size)
Experimental Group	4.5	8.2	12.45	0.000	2.07
Control Group	2.1	0.8	0.87	0.424	0.13

The feedback engagement in the experimental group was exceptionally high and reflected directly in the number of errors made. The second condition was therefore that the control group also did not reveal any correlation between the feedback engagement and errors decreased further, suggesting the notion that higher engagement with the online feedback systems leads to improvement in the outcomes of learning.

Table 14: ANOVA for Differences in Error Reduction Between Groups and Feedback Types

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-value	p-value
Between Groups	97.36	2	48.68	31.78	0.000
Within Groups	65.12	57	1.14		
Total	162.48	59			

The ANOVA analysis also reveals that there are differences between the groups and feedback types ($F = 31.78$; $p < 0.001$). This of course means that both the kind of feedback – open feedback or pre-structured ones and the group – experimental or control group, played a crucial role in the error reduction. The experimental group, which utilized the online feedback on the provided topics, did better than the control group, and the open-ended feedback easier to do than the pre-structured feedback.

Table 15: Post-Study Student Satisfaction Scores

Group	Satisfaction with Feedback (Mean)	Satisfaction with Error Correction (Mean)	Overall Satisfaction (Mean)
Experimental Group	4.7	4.5	4.6
Control Group	3.1	3.2	3.15

In particular, the students in the experimental group indicated the perceived level of feedback satisfaction as significantly higher than the level of the control group students about the received feedback and the error correction process. The mean score of their overall satisfaction was 4.6, for the appreciation of the online feedback system which was significantly higher than the control group whose mean score of overall satisfaction was 3.15. In consistency with the arguments made in this paper, students esteem more notable and enthusiastic feedback systems.

Table 16: Feedback Type Preferences by Student Group

Group	Open-ended Feedback Preference (%)	Pre-structured Feedback Preference (%)
Experimental Group	72.5	27.5
Control Group	40.0	60.0

The experimental group of students preferred open ended feedback by 72.5 % in contrast to closed ended feedback. The given findings could be explained by the fact that open ended feedback is considered to be more personal and helpful in terms of identifying individual mistakes. On the other hand, the participants of the control group expressed the received benefits primarily in pre-structured feedback format, which was chosen by 60.0%, most likely, because it is already familiar and does not require much effort to use**.**

Online Feedback and Error Correction

The results of this study also support the possibility of online feedback systems in enhancing writing error correction given the fact the experimental group received far less errors than the control group. The experimental group that received the online feedback had an average of 52.1/54.1 % improvement in grammar, vocabulary, and sentence structure errors, supported by earlier findings that state that the use of digital feedback systems produces better results in learning than the traditional means (Bitchener&Knoch, 2008). On the other hand, the control group of which adopted the conventional face-to-face mode of feedback reported little difference in the error disparity thereby strengthening the argument on the use of digital systems. This contrast supports the outcomes of other similar studies, and the idea of the ability of

the online feedback systems that allow learners as many opportunities for error correction as they are flexible and accessible (Cho & MacArthur, 2010).

The decreased error rates that were determined in analysis for the experimental group also contain the aspects of constructivism learning theories by presenting the most effective learning in the case of active participation supported by feedback; (Vygotsky, 1978; Hattie & Timperley, 2007). Online feedback systems provide the option for giving feedback at a closer temporal, situational, and individual level than with traditional paper feedback, which assists students in reflecting upon mistakes and on how to address them. Under which trends, feedback is not only a punitive measure, but an important stage in the process of achieving the goal, helping to start independent learning. However, as some researchers have rightly mentioned that the impact of online feedback mainly depends on the quality, specificity and relevance of the feedback provided to the needs of the learners as well as their learning requirements (**Archer**, 2010). The positive outcomes in this study are consistent with the hypothesis, which indicates to some extent that timely effective feedback supported by feedback's clarity and constructive feedback led to enhanced error correction.

It is necessary to turn to criticism of the possible shortcomings of online feedback systems. But the overall permissiveness of online feedback systems appears obvious. Feedback can be more easily given through technology which in turn can have dire consequences as some students may not have an easy access to technology or may not be fully literate in its use. For example, learnability research has revealed that access to technology can further contribute to gap in student achievement, especially in the areas where technology resources are scarce (Kormos&Csizér, 2014). Although online feedback systems can significantly contribute to error correction, this process should not be detached from general educational and socio-economic processes aimed at providing equal learning opportunities for everyone.

Besides, one must also bear in mind several potential drawbacks of the proposed online feedback systems inasmuch as their contribution to the construction of deep and meaningful interactions. The quantitative results revealed that the experimental group in this study found themselves more engaged with feedback than the conventional group for engagement. It should be noted that engagement signifies more effort from the students and depends on the value that is placed on the feedback format (Bitchener&Knoch, 2008). For example, some learners may have difficulties in understanding corrective or constructive feedback during written instructions as well as in performing certain tasks if they have not received further support or if they had not interacted face-to-face. This concern is also valid according to Hyland (210), who affirms that feedback is critical but encourages students in how they endorse the feedback received. Thus, further research should be directed toward the aspects of integrating both the digital and face-to-face feedback practices, to develop the mixed feedback solution that would combine the positive aspects of both the online systems and the regular feedback methods.

Feedback Engagement

Actively engaging with feedback was also found to be essential in error reduction in this study. There is a well-known finding, which supports other works with a similar focus on active engagement on feedback and enhanced learning outcomes of students (Hattie & Timperley, 2007; Kormos&Csizér, 2014). The error reduction improvement was evident in the experimental group students who used the feedback more interactivelysupporting the argument advanced that interaction is central to the feedback process. This is in a close harmony with the study done by Cho and MacArthur (2010) that proposed active response encourages the students to assimilate the correction and utilize it in the subsequent performance. In the case of writing for instance where learners must write and rewrite their papers, feedback engagement is not only about giving or receiving feedback and correction, but it also involves learners ruminating over their work, solving errors and reflecting over their mistakes.

However, the mechanisms of feedback engagement with the goal of improving the fragments correspond to the data of this study. Nonetheless, the processes of feedback engagement with the purpose of enhancing the fragments need further research. Engagement in feedback is commonly a motivational concept whereby students who are more motivated are likely to engage in deeper feedback. It is for this

reason in this studythe higher levels of engagement recorded in the experimental group could have been due to the constructiveness of online feedback that might have encouraged a feeling of ownership and responsibility among the students (Lee & Hannafin, 2016). On the other hand, the control group which was forced into the traditional feedback platform probably found it less exciting and even boring due to the lack of instant feedback and interaction. This explains why future studies should more particularly focus on the psychological and motivational aspects of feedback, as highly as the strategies that should be used to enhance the feedback appeal and its availability to all the learners.

Feedback engagement also presents another set up that can be used in devising the strategies to be followed in the particular Austin context of using feedback literacy that can be catered for the assessment of feedback engagement. Specifically, feedback literacy is defined as learners' capability to knowingly decode, interpret, comprehend, respond to, as well as use feedback adequately (Carless & Boud, 2018). Prior research findings have suggested that it is students who possess more feedback literacy are able to utilise feedback in the most appropriate manner, also derived the most marked improvement on their writing skills. Thus, feedback system includes not only the overestimated feedback but also the overall experience, thinking facilities and studying techniques of the students. Further studies should examine how particular site feedback literacy may be developed while focusing on situations where online feedback systems are steadily being introduced.

Feedback Type and Error Correction.

The comparison of open-feedback and pre-structured feedback showed the effectiveness of various kinds of feedback in mistake minimization. To be more specific, the more open-ended format that enables authors to provide more elaborated, individualized and situation sensitive feedback was identified as the one that yields fewer errors in all aspects. This finding bears some support to Hyland (2010) who stated that open-ended feedback is favourable to reflective thinking and independent problem-solving since the students must go through their mistakes and learn from them. This type of feedback encourages the development of critical thinking skills since the students are forced to think about why they made mistakes and how they could prevent them in the future.

However, there is one main drawback to such an approach that pre-structured feedback may be as efficient and stereotyped as reliable,and therefore, can provide fewer valuable insights as far as individuals' involvement is concerned. Whereas reflexive knowledge-based feedback is useful for managing obvious mistakes, it polarizes the learning of rationality by directing the learner's attention towards correct techniques instead of arousing further thinking (Bitchener&Knoch, 2008). This is a critique similar to one made by Greene&Azevedo(2005) who posited that there are limitations on a pre-scripted approach due to generalization.Nevertheless, it should be pointed out that predetermined feedback is rather more effective and convenient in terms of the time factor, therefore it may be appropriate when dealing with large groups or in conditions when time is an important factor. Papers could explore that using a combination of these two feedback types gives students the advantage of both getting immediate correct feedback and reflections about individual performances.

Open-ended feedback also creates some issues with regard to the training and preparation of instructors. The major advantage of open-ended feedback is that the instructor has to provide feedback, which is constructive as well as comprehensible to the student, but this has an added advantage in terms of skill and expertise of the instructors. This is a beautiful problem in situation that teachers cannot afford to spend more time orresources in giving detailed feedback (Hyland 2010). Thus, institutions ought to offer the professional development programs to teachers to enhance the feedback practices particularly when using online feedback techniques.

Applications About Limitations toFuture Directions

Nonetheless, some limitation associated with this study cannot be overlooked and require improvement in future research. First, the study was done in a certain institutional and cultural context where the findings might not be applicable in other zones or other systems of education. Since the level of technological

support available in educational systems might differ across the world, students and teachers' preparedness, practices in delivery might also be different, which in turn impacts the functionality of online feedback systems (Roddy et al., 2017). More research in this direction should try to use an equivalent design to calibrate generalisability of these findings across different educational contexts.

The study did not assess the potential of online feedback for tracing the process of the subject's writing evolution. Although the results shown in the two experiments pointed to substantial error decreases,long-term effects as well as the over-arching improvement of the general writing skills is still unclear. Earlier studies have found that although feedback is helpful, it has a least durable helpfulness when it comes to writing improvement, depending on how we incorporated the feedback into subsequent tasks (Bitchener&Knoch, 2008). Thus, quantitative follow-up investigations are required for depicting how the use of online feedback impacts writing performance in the long run.

Last of all, the present study emphasized on the issues connected with error correction in writing, but it is essential to point out that writing is a complex activity which implies not only the knowledge of grammar and vocabulary. The online feedback systems should be explored in other dimensions of writing that include coherence, organization and argumentation in future studies. This would give a better packaging of the knowledge of how feedback received on the Internet can be a complementary tool in teaching writing across the levels and genres.

Conclusion and Recommendations

The benefits learnt in the course of thisstudy underscored are the effects of online feedback systems in enhancing writing error correction among the undergraduate students in Saudi Arabia is a major finding of this study. The intervention highlights reveal that feedback that is presented online, especially when it is individualized and participative improves students' opportunity to correct Mista quotes in grammar, lexical items, and syntax. Writing in response to feedback, many participants in the experimental feedback group which interacted with the feedback systems showed lesser error rates than the control group that received traditional feedback, thus affirming the effectiveness of feedback tools in enhancing writing skills.

In addition, the study focuses on the value of feedback engagement on error correction, stating that the students who provide feedback are likely to receive the best outcomes of the learning process. The study also establishes feedback type whereby open feedback encourages deeper reflection than close feedback or feedback that is in some way moulded. However, the study also words some weakness of using online feedback systems with reference toinequity and difficulty in engaging the students, especially those with different learning abilities and learning styles. While the findings provide valuable insights into the benefits of online feedback systems, it is important to recognize that feedback's effectiveness is contingent upon factors such as student motivation, digital literacy, and the quality of feedback provided. Future research should explore these factors and examine the long-term effects of online feedback on overall writing proficiency, as well as its application in diverse educational contexts.

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