Implementing Wiki as an Asynchronous Tool to Enhance the Grammatical and Lexical Accuracy of Saudi Secondary-School Learners' EFL Writing

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Abstract

Wikis have been increasingly integrated into English-writing teaching and have served as one of the Web's most crucial social-networking tools, improving the writing of EFL learners worldwide. The purpose of this study has been to examine the positive effects of wiki-mediated collaborative writing and peer feedback on the grammatical and lexical accuracy of Saudi EFL learners' writing. To this end, 26 female secondary-school learners participated in the study and were selected from a private school in Riyadh. They were randomly assigned to a control group (N=12) and an experimental group (N=14). Both groups were given an identical writing task. However, in the control group, members individually completed the task, which was then reviewed by the teacher, while in the experimental group, members collaboratively completed the task, which was then reviewed by peers on a wiki platform. The data collection for this study rests on pre- and post-writing tests. The obtained data suggest that collaborative writing and peer feedback on wiki significantly improved the participants' grammatical, but not lexical, accuracy in their writing. However, the results of the post-test data also reveal that the experimental group outperformed the control group regarding the average total errors. The results confirm the efficiency with which wiki-based writing-oriented instruction can improve learners' accuracy.

Keywords: wikis, writing accuracy, grammatical errors, lexical errors, collaborative writing, peer feedback

1. Introduction

1.1 Overview

Many teachers have used Web 2.0 technology to strengthen the motivation and academic prowess of learners studying English as a foreign language (EFL). The term 'Web 2.0', as defined by Ozcinar et al. (2020), refers to a "more personalized, communicative form of the World Wide Web. Participation, connection, collaboration and sharing of information and ideas among users [constitute] an innate part of it" (p. 221). With advances in web-based learning, EFL educators have sought to create learning environments in which technology facilitates English-writing pedagogy (Al Abri et al., 2021). In this endeavor, Web 2.0 technology is preferred because it enables users to contribute to global knowledge (Faizi, 2018). These contributions take place when users share and comment on information rather than merely read it (Cong-Lem, 2018). Web 2.0 applications thus encourage users to take responsibility for what they write and post. This pressure is due, in part, to the pressure that users feel when they write for a wide audience: as writers, Web 2.0 users grow more attentive to what they write and how they write it. As a result, the use of Web 2.0 applications can increase EFL learners' exposure to a target language, including EFL. One characteristic of learners' writing is their effort to use appropriate language when communicating with others (Almekhalfy & Alzubi, 2016).

Wikis are one of the most efficient types of Web 2.0 tools. Having gained popularity in the last few years, wikis have been used widely in writing classes, on the specific pedagogical premise that wikis can enhance writing skills (Ebersbach et al., 2008). The word 'wiki' originated from the Hawaiian word for 'quick' because, on wikis, accessing data can be lightning fast (Isamiddinovna, 2021). Some wikis effectively use language in a simplified format that users can easily build on and that requires neither special software nor special web skills (Allwardt, 2011). A wiki functions similarly to a word-processing program and can help users undertake a variety of instructional activities (Arnold et al., 2012). In addition to building on an existing wiki platform, users can take charge of their own wiki site, with only very basic word-processing skills needed for the activity (Heng &

Marimuthu, 2012). A wiki, like any other social-networking tool, offers a platform on which users write in order to promote various levels of collaboration and scaffolding. Thus, on wikis, learners can assist one another in organizing, creating, and modifying content that eventually transforms into high-quality texts (Lee, 2013). Despite the various advantages of wikis, they remain largely unknown and unutilized in Saudi schools.

In the Saudi context, a great number of research studies have reported various benefits arising from educational applications of wikis, particularly regarding language learning. As an illustration, wikis have been found to improve vocabulary knowledge (Al-Johali, 2019), independent learning, motivation (Aldayel, 2018), collaborative environments (Al Khateeb, 2014), literacy skills (Alharbi, 2015). With an emphasis on writing, a number of studies have noted that wikis can play positive roles in learners' writing performance (Aljafen, 2018; Alshumaimeri, 2011; Khan & Hameed, 2021; Mohammed & NourEldean, 2020). However, further research is still needed to clarify how exactly a wiki can improve the linguistic accuracy of learners' writing. For example, a survey of the extant research reveals that most studies have focused on higher-education learners, not on middle- and secondary-school learners. An exception is the study by Alshalan and Alfaddah (2010), who examined the effects that wiki-based process writing could have on the performance of Saudi female secondary-school learners. Nevertheless, the study's learners were enrolled in an international program, not a native Saudi context. The aim of the current proposed research is to fill the gap in this literature by examining how wikis can enhance the grammatical and lexical accuracy of Saudi female EFL learners' writing in a private secondary school.

1.2 Research Objectives and Questions

The study has had two central aims. The first one has been (1) to ascertain how effectively wiki-mediated writing enhances the grammatical and lexical accuracy of Saudi EFL learners' writing. The second aim has been (2) to ascertain and compare the effects of wiki-mediated writing and non-wiki-mediated writing on the grammatical and lexical accuracy of Saudi EFL learners' writing. In these regards, the following questions have been addressed:

1) Does wiki-mediated writing enhance the grammatical and lexical accuracy of Saudi female EFL learners' writing?

2) Is there any significant difference between the effects of wiki-mediated writing vs. non-wiki-mediated writing on the grammatical and lexical accuracy of Saudi female EFL learners' writing?

2. Literature Review

2.1 Grammatical and Lexical Accuracy in EFL Learners' Writing

Foster and Skehan (1996) defined accuracy as "freedom from errors" (pp. 303-304). Linguistic accuracy, because it is associated primarily with the notion of error (Bui & Skehan 2018), is an essential aspect of writing accuracy (Khosravi & Taheri, 2018). Writing entails making the appropriate choices regarding syntactic patterns, morphological inflections, vocabulary, and cohesive devices, and putting them all together into a coherent text (Hyland, 2003, p. 3; Matsuda, 2003, p. 1920; Silva, 1990, p. 13). Therefore, writers have to focus on the semantic and syntactic aspects of a language because inadequate grammatical and lexical knowledge can lead to poor writing (Khosravi & Taheri, 2018). According to Llach (2011), grammatical and lexical knowledge is required for, and specifically is a prerequisite to, writing. As a result, grammatical and lexical errors are representative of learners' good or bad skills in writing.

A serious issue in EFL learners' writing is a lack of grammatical or lexical accuracy. Lexico-grammatical errors are common in these people's writing and prevent them from producing good-quality compositions (Luo & Liao, 2015). Many studies have investigated the linguistic errors made by EFL learners and have found that, when writing, EFL learners make both grammatical and lexical errors (Chaudhary & Al Zahrani, 2020; Karazoun, 2016; Lahuerta, 2018; Nuruzzaman et al., 2018; Sermsook et al., 2017; Zülal, 2020).

2.2 Grammatical and Lexical Errors

Grammar knowledge is essential for learners because without it, learners are unlikely, or even unable, to use language accurately and fluently in both spoken and written forms (Dkhissi, 2014; Larsen-Freeman, 2015). Good writing requires a great competence in grammar. Grammar enables learners to "combine words and sentences" to build precise sentence structures (Farangi et al., 2017, p. 393).

Research has shown that grammar is the most error-prone area in which learners make the most errors. Garca-Pastor (2018) conducted a study to investigate the linguistic accuracy of secondary-school Spanish learners by analyzing their composition errors. According to the findings, learners exhibited a strong grasp of lexis but a weak grasp of morphology (grammar) in the target language. In the Saudi context, Nuruzzaman et al. (2018) found

that the most common errors made by Saudi EFL learners when they write English paragraphs fall into four categories: grammar, lexis, semantics, and mechanics. However, grammar has been identified as the area in which learners are most fallible: they make more errors of a grammatical kind than of any other kind. In their research, AlTameemy and Daradkeh (2019) investigated the types and frequencies of errors in paragraph compositions made by 80 EFL students at Prince Sattam bin Abdulaziz University's Preparatory Year Deanship. The analysis of the 80 paragraphs at the sentence and paragraph levels revealed that the 80 learners made a total of 1,580 errors, of which 42.15 percent were grammatical errors made at the sentence level.

Although the importance of grammar in the process of writing a composition has been the primary focus of many EFL teachers in their writing instruction (Suetae, 2010), research findings have highlighted the importance of vocabulary knowledge as a key indicator of second-language writing development as well as of writing performance (Johnson et al., 2016). Vocabulary plays a significant role in producing a complete spoken or written text (Dakhi & Fitria, 2019). Alqahtani (2015) claimed that acquiring a sufficient vocabulary is essential for effective foreign-language use; otherwise, learners would be unable to use their assiduously learned elements of grammar. Supporting his view, Llach (2011) stated that other linguistic systems are intricately linked to lexicon, and that inadequate knowledge of lexical items causes errors.

In relation to the role of vocabulary in language teaching, many EFL learners make various types of errors in their written compositions, and lexical errors are the most common (Ander & Yildirim, 2010). According to Llach, 2011, lexical errors outweigh grammatical errors. Moreover, lexical errors can directly affect the accuracy ratio of writing (Nation, 2013): a decrease in lexical errors results in an improved accuracy ratio, and vice versa (Valizeda, 2021).

2.3 Collaborative Writing to Enhance Accuracy

Collaborative writing increases the chances that learners will interact productively with the given language so that they can collaboratively attend to linguistic problems (Li & Kim, 2016). Research has shown that learners write better collectively than individually (Elabdali, 2021), and learners' writing accuracy can be improved through collaboration (Rashid et al., 2019; Safdari, 2021; Sulistyo et al., 2019; Torabi, 2021; Villarreal & Gil-Sarratea, 2020). Collaborative writing is effective at improving writing accuracy in the long run. At different periods of time, Chen (2019) analyzed two groups of individual written texts: post-tests produced by learners who had been exposed to collaborative writing and post-tests produced by learners who had undergone no such exposure. The study concluded that collaborative writing improved learners' performance in terms of accuracy, fluency, and quality (organization, vocabulary, and grammar). The A post-test, delayed by two months, yielded the same results for accuracy and fluency; however, no improvements were observed for organization.

Several studies have reported that collaboration positively affects both the lexical and grammatical accuracy of EFL learners' writing (Dobao & Blum, 2013; McDonough & De Vleeschauwer, 2019). Other studies have revealed that collaboration affects learners' grammatical accuracy (Dobao, 2012; Jafari & Ansari, 2012; Jalili & Shahrokhi, 2017; Meihami et al., 2013). However, Shehadeh (2011) found that collaborative writing had positive effects on content, organization, and lexical accuracy, but not on grammatical accuracy. All these studies indicate that collaborative learners can write a higher-quality text with fewer errors than individual learners can.

2.4 Peer Corrective Feedback to Enhance Accuracy

Peer feedback is "a learning strategy in which learners work together and comment on one another's work or performance and provide feedback on strengths, weaknesses, and suggestions for improvement" (Loan, 2017, p. 253). Peer feedback helps learners improve their ability not only to express, in writing, various critical thoughts but also to reflect on, expand, and deepen their knowledge (Noroozi & Hatami, 2019; Tian & Li, 2018). Peer feedback has been supported from different theoretical perspectives such as process-writing theory, interactionist theory in second-language acquisition, collaborative-learning theory, and sociocultural theory (Hojeij & Hurley, 2017; Yu & Lee, 2014, 2015; Zhu & Mitchell, 2012). Informed by these theories, research has shown that peer feedback enhances learners' writing by scaffolding their approach to writing and revising (Hanjani, 2019), by enhancing self-regulation and self-reflection in learning, and by engaging in interactive communication (Tsuroyya, 2020). Furthermore, a draft text that undergoes peer feedback can strengthen reading-and-writing connections and can promote the linguistic, semantic, and rhetorical content of a text (Suryani et al., 2019).

Several studies have confirmed that peer feedback can improve learners' writing performance (Huisman et al., 2018; Huisman et al., 2019; Zhang & McEneaney, 2020). For example, Homayounzadeh et al. (2016) conclude that peer feedback can develop learners' language acquisition and written accuracy over the long term. However, opposing findings have been reported, as well. In this regard, Ruegg (2015) compared how peer and teacher feedback can improve the quality and accuracy of learners' writing. According to the study's findings, neither

teacher feedback nor peer feedback improved writing quality. However, writing accuracy significantly improved in the group that had received teacher feedback. This difference in improvements might be attributable to a vital problem associated with peer feedback: it typically limits itself to surface errors (e.g., ideas and structure) rather than provide essential corrections of errors related to vocabulary and grammar (Pham, 2020).

2.5 Wiki-Mediated Writing

Wikis, as noted in the introduction of the present study, are a Web 2.0 technology, and according to Al Shabibi (2019), they have opened up new possibilities for collaborative learning. Specifically, wikis have been found to enhance the interactions and writing skills of learners (Elola & Oskoz, 2010; Hsu & Lo, 2018; Kessler & Bikowski, 2010). A wiki is an efficient tool for facilitating collaborative writing outside the four walls of a classroom because the open editing and the review structure that are built into wikis can greatly strengthen negotiations, critiques, and reviews, all of which assist learners in co-constructing new knowledge (Castañeda & Cho, 2013). A wiki's asynchronous support of online collaboration grants learners more opportunities to focus on form (Lee, 2010) and to think about appropriate vocabulary (Mohammed & NourEldean, 2020). These benefits are due, in large measure, to the fact that wikis create additional time for reflection, which promotes "refined thinking and recursive writing" (Li, 2020, p. 150). Many studies have examined wiki-mediated collaborative writing (e.g., Aydin & Yildiz, 2014) and have found that learners, when co-producing texts, were encouraged to edit not only their own postings but their peers' postings, as well, with the result that both the self- and peer-corrections improved the accuracy of all the postings.

A number of studies have examined the effect of wiki-mediated collaborative writing on EFL students' writing accuracy. Hsu and Lo (2018) investigated the effect of wiki-mediated collaborative writing on 52 learners at a Taiwanese university. They were divided into two groups, a wiki-collaborative writing group (n = 26) and an individual writing group (n = 26). For the data collection, the study used an individual writing task as a pre-test and another as a post-test. The data was analyzed in terms of content, organization, linguistic complexity, and accuracy. The findings indicate that wiki-mediated collaborative writing significantly enhanced learners' individual writing for the content quality and linguistic accuracy but not for the organization and linguistic complexity.

The findings from another recent study, Hosseini et al. (2021), were similar to those from Hsu and Lo (2018). The 2021 study explores the effect of wikis on learners' writing accuracy. The participants were 72 Iranian EFL learners from a language institute in the Iranian County of Gachsaran. The researchers employed a quasi-experimental research design to achieve the objective of the study. According to the results, the experimental group that had experienced wiki-based collaborative writing performed better on the post-tests than on the pre-tests regarding writing accuracy.

Nami and Marandi (2014) investigated whether or not wikis enhance grammatical accuracy. With 20 Iranian EFL learners serving as participants, the study used a wiki as a forum for out-of-classroom discussions regarding English writing and, to analyze 50 wiki posts, adopted both quantitative and qualitative measures. The findings revealed that students were most likely to use the wiki to ask questions and disseminate solutions to peers. The students also tended to pay close attention to the grammar, spelling, and punctuation in posts. Similarly, Hsu (2019) found evidence that learners, in general, tend to focus on grammar more than on vocabulary during wiki-mediated collaborative writing.

In contrast to the previous findings, however, Caruso (2014) found that wiki-based collaborative writing seemed to improve learners' individual written work in terms of fluency, especially among less fluent writers, but there was no evidence of an improvement in written complexity or accuracy.

In investigating the effectiveness of peer feedback in wikis, Al Abri et al. (2021) found that wiki-mediated peer-feedback tasks improve EFL learners' writing regarding such matters as grammar, spelling, and lexical resources. Another study, Gharehbagh et al. (2019), found that wiki-mediated peer feedback about written works can enhance the accuracy of learners` writing. The participants of the study were 14 non-Malaysian learners who had enrolled in a language school in Kuala Lumpur and had registered in IELTS preparatory classes. The participants were asked to use a correction checklist so that they could provide feedback about peers' essays. The researchers quantitatively assessed learners' pre- and post-test scores. The results show that the content, organization, vocabulary, and grammar of learners' writing had significantly improved during the period between the two tests.

In regard to grammatical accuracy, Vahedipour and Rezvani (2017) investigate the effects of wiki-mediated feedback on 50 intermediate Iranian EFL learners (both males and females). They were divided into experimental and control groups. The first drafts of the control group were reviewed traditionally (without a wiki) while the experimental group's drafts were reviewed by peers on a wiki platform, with the focus being on the grammatical

accuracy of the writings. All the second drafts were reviewed by the instructor. To collect the quantitative data, the researchers used two sets of data: first, the grammar scores of the writing pre-test and post-test; and second, a questionnaire measuring the participants' perceptions of and attitudes toward the wiki-based feedback. The results of the analysis reveal that the wiki-based feedback on students' writings significantly improved the participants' grammatical accuracy in a writing task.

Mohammed and NourEldean (2020) examine whether wiki can affect the accuracy with which learners correct errors and the motivation with which learners create a writing. Wiki was used as a medium for peer feedback, and learners assessed and edited their peer-written work concerning grammatical accuracy and mechanics. Sixty Saudi EFL learners form Prince Sattam University participated in the study. The researchers adopted a quasi-experimental design. The two researchers collected their data by using a pre-writing test, a post-writing test, and a motivation questionnaire. The results show that the experimental group outperformed the control group on the post-test. In addition, wiki-based writing and wiki-based peer feedback seem to have significantly enhanced the motivation and decreased the grammatical errors of participants.

3. Methodology

3.1 Research Design and Method

The research employed a quasi-experimental research design. In contrast to experimental designs, which typically involve the random assignment of individuals to groups, a quasi-experimental design is used when the researcher is unable to randomly assign participants to the study (Gay et al., 2012). The quasi-experimental design is commonly used in educational research because many classes cannot be arranged for research purposes in schools, necessitating the use of groups as they are (Ary et al., 2019). Figure 1 illustrates the design of the current study:
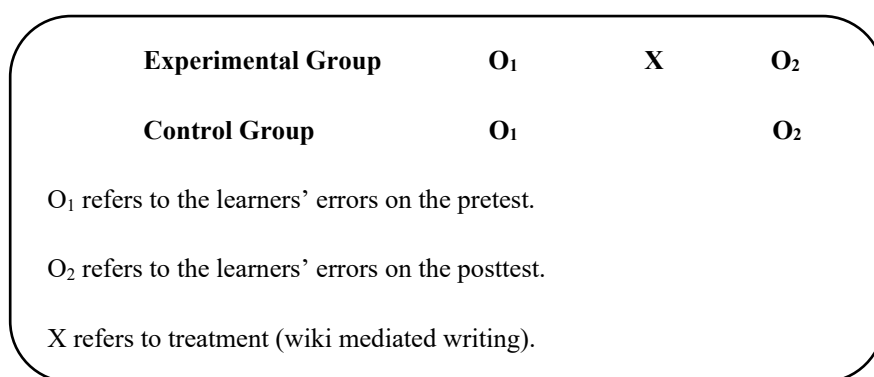
Experimental Group	O_1	**X**	O_2
Control Group	O_1		O_2

O_1 refers to the learners' errors on the pretest.

O_2 refers to the learners' errors on the posttest.

X refers to treatment (wiki mediated writing).

Figure 1. Research design

3.2 Setting

The data collection for this research was conducted at Trbyh Namouthajiya schools in Riyadh in the first semester of the 2021–2022 academic year.

3.3 Participants

The participants were all Saudi female second-year secondary-school learners whose ages ranged between 16 and 17 and shared the same cultural and socioeconomic qualities. The total number of participants was 40, but 14 students dropped out because of their absence from the pretest, leaving a sample size of 26 students. They were randomly assigned into experimental and control groups. The control group (n=12) was engaged in traditional writing and teacher feedback while the experimental group (n=14) was engaged in online collaborative writing and peer feedback using a wiki.

3.4 Instruments

3.4.1 Pretest and Posttest

The participants were asked to complete an individual writing task before the treatment and the same writing task was administrated at the end of the experiment. Both the control group and the experimental group performed the same writing task. Moreover, because the study focuses only on grammatical and lexical improvements in the participating students' essays, the researcher checked only for grammatical and lexical errors in the essays.

3.4.2 Wiki Database

The researcher created a wiki webpage for the data-collection step by using the PBworks.com wiki website.

3.5 Procedure

The study consisted of four sessions that were administered over a four-week period. The first session was the pretest, the second and third sessions were for the experiment, and the last session was the posttest. Regardless of which group they were in; all the students took the pretest in the form of an individual essay-writing task.

3.5.1 Administrating the Pretest and Post Writing Test

The task was designed to meet the writing objectives of the textbook *Mega Goal 3* regarding the composition of short essays. The two groups of participating students were given the length of a typical class period (45 minutes) to finish the task. The topic of the writing task was familiar to the students and mirrored the types of topics covered in the textbook. The topic of the pretest and posttest was "the importance of technology in our lives" (see Appendix A). Both the control group and the experimental group completed the writing task in a traditional classroom setting.

3.5.2 The Wiki-Mediated Writing Group

In the first week after the pretest, the researcher held a short meeting with the participants in the experimental group (i.e., the wiki-mediated writing group) to introduce them to the wiki webpage and to give them their unique usernames and passwords. Then, the researcher created a class using the "My U" app to facilitate normal follow-up communication between the participants and her regarding basic questions, concerns, and clarifications. The researcher selected the app because it was familiar to the participants and, in fact, had already been used by their teachers. The researcher prepared and delivered tutorials demonstrating three important points to the participants: (1) how they could access the workspace where the essay-writing task would take place, (2) what the most important features of the wiki were (i.e., the edit, save, and comments features), and (3) how the participants could correct their classmates' essays by uploading the correction codes on the app and using them. Afterward, the researcher asked the participants to divide themselves into groups of two to write an individual essay.

In the second week after the pretest, the researcher created the wiki webpage, and the first page clarified everything learners must do (for a screenshot of it, see Figure 2). For the sake of convenience, each pair was provided with a direct link to the page where each group member would write the essay. This linked wiki webpage featured a video tutorial that familiarized the participants with the wiki writing environment before they started the actual writing.

The researcher asked each pair of participants to collaboratively write a review of a film or book in the form of an essay (introduction, body, and conclusion). The teacher of the participating students' English class chose the topic, and the essay-writing task was, in fact, part of a classroom project that the students would, at the end of the experiment, have to submit to the teacher for actual grading. The teacher had taught the students in advance how to write a book or film review, and had provided them what each part of such an essay must contain.

Figure 2. Screenshot of wiki page

In the third week of the study, after writing the first draft on the wiki page, each participating student was required to read, review, and create individual feedback on an essay that one of the essay-writing pairs had written and uploaded to the wiki page. The students used correction codes to identify the grammatical and lexical errors in the peer-written essays. During the whole third week, students were also commenting on the essay-related feedback

provided to them by their peers. The next step for the participating students was for them to rewrite their own essays. The revised writing—that is, their final draft—was submitted to the teacher.

In the fourth week, the researcher administered a writing posttest to determine how much the wiki webpage had affected the Saudi EFL learners' grammatical and lexical accuracy in writing.

3.5.3 The Non-Wiki-Mediated Writing Group

As for the control group (i.e., the non-wiki-mediated writing group), these students were asked to write an essay not collaboratively in a pair but individually, without assistance from anyone. The subject of the essay (a book or film review) remained the same, and these participants, like the previous ones, had received instruction about what each of the essay's three sections had to include. These participants were given a week to submit the first draft. Then, the teacher would give them only general feedback, the aim of which was to promote self-correction. After receiving the teacher feedback, the students were given an additional week to revise the essay on their own and then to submit the final draft again to the teacher. Figure 3 presents the timetable and procedure of the study.

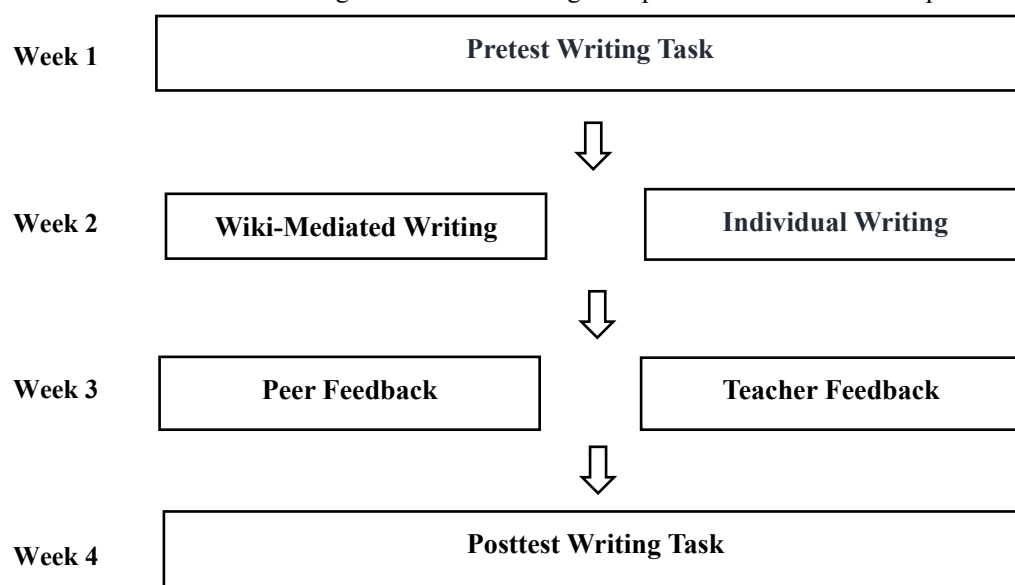|	
Week 1	**Pretest Writing Task**
Week 2	**Wiki-Mediated Writing** **Individual Writing**
Week 3	**Peer Feedback** **Teacher Feedback**
Week 4	**Posttest Writing Task**

Figure 3. The timetable and procedures of the study

3.6 Rating the Pretest and Posttest

After the pretest and posttest were administered, two raters—the researcher and a native English speaker with over twenty years of professional editing experience—highlighted each error found in each learner's essay. The two raters used a table consisting of nine grammatical errors and two lexical errors to standardize and facilitate the process of detecting the errors in the students' essays. The table of the grammatical errors was adapted from Ferris (2003), with a little further modification resulting from the addition of the two lexical-error categories. In this way, the completed tables would align with the research objectives (see Appendix B). Thereafter, the raters filled in two columns of empty cells in the table regarding (1) each essay's total number of certain types of errors and (2) the rankings of the errors, from most common to least common (see Appendix C). The researcher then compared her data with the native English speaker's data to determine whether or not they had, in general, the same errors.

4. Result

4.1 Pre-Test Results

For the pre-test results, the study used a paired-sample t-test to identify the statistical differences between the means of the total errors in the control and experimental groups.

Table 1. Paired- sample t-test results for differences between the control and experimental groups' average total pre-test errors

	Group	Mean	SD	T	P
Pre-test average	control	2.43	2.02	0.784	0.451
	experimental	2.27	2.40		

* P value < 0.05; ** P value < 0.01

It is clear from Table 1 that there are no statistically significant differences between the control and experimental groups in the pre-test regarding total errors (p-value = 0.451 > 0.05). This calculation indicates that the two groups are basically equivalent and homogeneous in this regard.

4.2 Post-Test Results

4.2.1 Research Question 1

To answer the first research question ("Does wiki-mediated writing enhance the grammatical and lexical accuracy of Saudi female EFL learners' writing?"), the errors of the experimental group's pre-test and post-test essays were compared with a paired- samples t-test.

Table 1. Paired-samples t-test results for differences between the experimental group`s pre- test and post-test errors regarding grammatical and lexical accuracy (n=14)

	Test	Mean	SD	T	P	η2
Grammatical errors	pre-test	20.00	8.37	3.378	0.005**	0.178
	post-test	12.79	7.71			
Lexical errors	pre-test	10.79	7.66	0.932	0.368	0.012
	post-test	9.36	5.43			
Total errors	pre-test	30.79	14.66	2.536	0.025*	0.099
	post-test	22.14	12.33			

* P value < 0.05; ** P value < 0.01

Table 2 presents the t-value for the grammatical-error results (3.378) and the corresponding p value (0.005), which is less than the significance level (0.01). That is, there are statistically significant differences between pre-test and post-test data for the experimental group. The average grammatical errors for the pre-test (20 + 8.37) and the post-test (12.79 + 7.71) indicate the presence of statistically significant differences, thus favoring the assertion that the post-test results had, on average, fewer errors than the pre-test results. Furthermore, the Eta Square (η2 = 0.178) indicates a large effect.

Table 2 also presents the t-value for the lexical-error results (0.932) and the corresponding p-value (0.369), which is more than the significance level (0.05). That is, there are no statistically significant differences between the pre-test and the post-test results for the experimental group in this regard.

Finally, Table 2 presents the t value for the total-error results (2.536) and the p-value (0.025), which is less than the significance level (0.05). That is, there are statistically significant differences between the pre-test and post-test results for the experimental group in this regard. The average total errors for the pre-test (30.79+14.66) and the post-test (22.14+12.33) indicate the existence of statistically significant differences, thus favoring the assertion that there were fewer average errors in the post-test than in the pre-test. Furthermore, the Eta Square (η2 = 0.012) indicates a medium effect.

Overall, the results for the experimental group, ranging from the pre-test to the post-test, demonstrate that there were improvements in students' grammatical accuracy, but not their lexical accuracy. However, the treatment (using wiki) reduced the students' total errors significantly.

4.2.2 Research Question 2

Regarding the second research question ("Is there any significant difference between the effects of wiki-mediated writing vs. non-wiki-mediated writing on the grammatical and lexical accuracy of Saudi female EFL learners' writing?"), the researcher again ran paired-samples t-tests to identify the difference between the experimental and control groups regarding the grammatical and lexical accuracy of the students' respective essays. To accomplish this, the researcher compared the two groups with each other regarding their average total post-test errors.

Table 2. Paired-samples t-test results for differences between the control and experimental group's average total post-test errors

	Group	Mean	SD	T	P	η2
Post-test average	Control	2.43	2.49	3.378	0.004**	0.029
	Experimental	1.67	2.11			

* P value < 0.05; ** P value < 0.01

Table 3 presents the t-value for the comparison between the control and experimental groups regarding average total post-test errors (3.378) and the p-value (0.004), which is less than the significance level (0.01). That is, in this particular regard, there are statistically significant differences between the two groups. The average total post-test errors for the control group (2.43 + 2.49) and for the experimental group (1.67 + 2.11) indicate the presence of statistically significant differences, thus favoring the assertion that wiki-mediated writing reduced the experimental group's writing errors. Furthermore, the Eta square (η2 = 0.029) indicates that the effect was small.

The researcher ran a paired-samples t-test to check for any differences between pre-test and post-test errors for the control group, as shown in Table 4.

Table 3. Paired- samples t-test results for differences between the control group`s pre-test and post-test scores regarding grammatical and lexical accuracy (n=12)

	Test	Mean	SD	T	P
Grammatical errors	pre-test	18.33	5.16	1.328	0.211
	post-test	16.42	6.02		
Lexical errors	pre-test	8.42	5.48	-1.214	0.250
	post-test	10.33	6.02		
Total errors	pre-test	26.75	7.48	0.000	1.00
	post-test	26.75	7.48		

* P value < 0.05; ** P value < 0.01

Table 4 presents the t-value for the grammatical errors (1.328) and for the lexical errors (-1.214) and the respective p-levels (0.211) and (0.25), each of which is greater than the significance level (0.05). That is, there are no statistically significant differences between the pre-test and post-test errors for the control group. In addition, Table 4 presents the t-value of the total errors (0) and the p-value (1), which is greater than the significance level (0.05). That is, there are no statistically significant differences between the total pre-test and post-test errors for the control group in this regard.

Overall, the results of the pre-test and post-test analyses regarding the control group's grammatical errors, lexical errors, and total errors demonstrate that the post-test results for neither grammatical accuracy nor lexical accuracy exhibited any improvement over the corresponding pre-test results. This finding is supported by the results of the descriptive statistics and the paired-samples t-tests.

4.3 Types of Errors Made by the Experimental Group (EG) in the Pre-Test and Post-Test Essays

Most students in the experimental group made errors in the pre-test, but some types of errors declined in frequency after the treatment. The following examples illustrate some of the most prominent types of errors that they made in the pre-test and the post-test.

Example 1 of Types of EG Errors: grammatical (unnecessary article); lexical (spelling)

Pre-test: *The technology is *importent…*

Post-test: *Technology is the most important thing in our *life.*

In the above example, the student in the pre-test made two types of errors: she incorrectly placed the definite article ('the') before the noun 'technology'. She also misspelled the word 'important'. After the treatment, she took the post-test and was able to avoid both of them, but she made another grammatical error, this time regarding a noun ending (she should have used 'lives', not 'life').

Example 2 of Types of EG Errors: grammatical (word endings)

Pre-test: *It will become much *more* easy than it is now.*

Post-test: *It makes things much easier like shopping…*

In Example 2, a student used the incorrect comparative ending for the adjective 'easy' before the treatment, but avoided the error after the treatment.

Example 3 of Types of EG Errors: grammatical (subject–verb agreement).

Pre-test: It *save a lot of time.

Post-test: *It makes things so much easier.*

In Example 3, a student on the pre-test used the plural form of the verb 'save' for the singular subject 'it'. After the treatment, however, the students avoided this error entirely, correctly matching the singular form of the verb 'make' with the same singular subject, 'it'. In short, grammatical accuracy improved after the treatment.

Example 4 Types of EG Errors: lexical (spelling)

Pre-test: *We lost a lot of people *becase of the *viras.*

Post-test: *We *fasd a *dificut time *becase of corona *viars.*

The student in the above example misspelled 'because' and 'virus' in the pre-test. Following the treatment, she misspelled four words ('faced', 'difficult', 'because', and 'virus'), with the last two words having the same misspelling as in the pre-test. It is clear that, after the treatment, misspellings remained an error-prone area of writing for this student.

4.4 Types of Errors Made by the Control Group (CG) in the Pre-Test and Post-Test Essays

The examples below demonstrate various types of errors made by the learners in the control group in the pre- and post-test essays, where they received teacher feedback and wrote individually.

Example 1 of Types of CG Errors: grammatical (unnecessary article); lexical (spelling)

Pre-test: **The technology make our lives *esyiy.*

Post-test: *…and make our *life *eseiy…*

In Example 1, the student incorrectly used the definite article ('the') to qualify the noun 'technology' and then substantially misspelled the comparative adjective 'easier'. In the posttest, the same student incorrectly used a singular noun rather than its plural form and again substantially misspelled 'easier'. Similar mistakes were made, in this student's case, in the two essays.

Example 2 of Types of CG Errors: grammatical (unnecessary article, word ending, subject– verb agreement); lexical (spelling)

Pre-test: *Do you think *the technology *are important?*

Post-test: *We all know how technology *are important in our* life.*

In Example 2, it is again apparent that similar and even identical mistakes surfaced in both the pre-test essay and the post-test essay. Although this student correctly omitted the definite article ('the') in the post-test essay, after having made the mistake in the pre-test essay, she incorrectly used a plural verb ('are') with a singular noun ('technology') in both of the essays. In addition, she made a mistake made by quite a few other students: using the singular noun 'life' when the plural form was preferable.

Example 3 of Types of CG Errors: grammatical (unnecessary article & word choice); lexical (spelling)

Pre-test: *Have you ever thought that all **the people *well use technology all the time?*

Post-test: *Today all **the pouple use *the technology.*

In the third and final example for the control group, we can see that this student, like the other control-group students, often repeated the same grammatical and lexical errors in both tests. Here, the student incorrectly placed the definite article ('the') before the noun 'people' in both the pre-test and the post-test. She made the same type of error in the post-test for the noun 'technology'. As illustrated in the two sets of examples (one for the experimental group and the other for the control group), only the experimental group performed better on the post-tests than on the pre-tests regarding grammatical accuracy. The control group exhibited no major improvements in this regard.

5. Discussion

The first research question addresses how learners' collaborative wiki-mediated writing involving peer feedback can affect the grammatical and lexical accuracy of the writing. According to data-analysis results, the post-test writing was significantly better than the pre- test writing with regard to grammatical accuracy. This finding is consistent with findings reported in other studies (Hsu, 2019; Mohammed & NourEldean, 2020; Nami & Marandi, 2014; Vahedipour & Rezvani, 2017), which found that learners' use of a wiki affected their grammatical accuracy. This observed phenomenon might be due to the fact that wikis' asynchronous support of online collaboration gives learners more opportunities to focus on form as reported by Lee (2010). The findings are also consistent with those of Hsu (2019), which reveal that learners who are writing posts on wikis tend to focus more on grammar than on vocabulary. Similarly, Tolosa et al. (2013) found that learners who are creating computer mediated feedback focus more on grammatical errors than on vocabulary errors. This explanation might explain why, in the present study, the grammatical accuracy of the experimental group improved over time. The aforementioned finding of the

current study stands in contrast with Ruegg (2015), which investigated the effects of teacher feedback and peer feedback on learners' grammatical accuracy. She found that grammatical accuracy significantly improved in the group that had received teacher feedback, and she claimed that feedback on grammatical errors is best provided by teachers. The finding is also inconsistent with Pham (2020), which argues that peer feedback generates reliable corrections only of surface errors (e.g., ideas and structure), not of lexical and grammatical errors. On the other hand, the results of the experimental group were statistically negative in terms of lexical accuracy. This finding does not align with the findings presented in other studies, which found that wikis improve the grammar, spelling and vocabulary of EFL learners' writing (Al Abri et al., 2021; Gharehbagh et al., 2019). A possible explanation of this finding is that the effects of wikis vary according to learners' proficiency level. Because inadequate knowledge of lexical items causes errors in word usage, lexical knowledge and English- proficiency level are correlated with each other. It has been found that vocabulary size and depth were significantly correlated with lower-proficiency students (Enayat & Amirian, 2020). Perhaps the students' low proficiency in English prevented them from providing satisfactory lexical support to each other during collaborative and feedback-oriented activities. The present study concerns primarily the effects of wikis on two basic forms of lexical accuracy: misspellings and semantic errors. There are possible explanations for this finding with respect to misspelling. It might be attributable to the short duration of the treatment that affected the capability to reduce errors such as misspellings. Unlike the rules of grammar, the rules of vocabulary, especially as they pertain to spelling, are highly inconsistent and cannot be mastered by students without sufficient time and practice. In addition, wikis' spell-checker might be a double-edged sword: because it helps students to spot misspelled words, the tool might generate a certain amount of carelessness in students, who become inattentive to spelling. These factors could explain why students experienced improvements in grammar but not in spelling.

The second research question addresses whether or not there are significant differences between the experimental group and the control group regarding grammatical and lexical accuracy, as measured by average total post-test errors. The findings reveal that there were significantly fewer errors in the experimental group than in the control group. In other words, because of the wiki, the members of the experimental group wrote more accurately than their counterparts in the control group. This finding is in line with Hosseini et al. (2021), which shows that the accuracy of students in wiki groups outweighed the accuracy of students in traditional writing groups. However, the finding is inconsistent with Caruso (2014), which found that wiki-based collaborative writing did not improve the accuracy of learners' individual written work. From a broader perspective, a possible explanation for the above finding is that learners write better when working in pairs or small groups than individually (Elabdali, 2021; Shehadeh, 2011). Wikis are considered an efficient tool for facilitating collaborative writing, which itself can help learners write a higher-quality text with fewer errors, thereby enhancing writing accuracy as reported by (Rashid et al., 2019; Safdari, 2021; Sulistyo et al., 2019; Torabi, 2021; Villarreal & Gil-Sarratea, 2020). Furthermore, wikis may have helped the members of the experimental group share knowledge among one another, make appropriate language-choices, and give and receive feedback. A likely reason for these improvements is that the wiki-based environments in which the students were operating are generally less threatening and more relaxed than teacher-helmed environments are.

6. Conclusion

With the advancement of computer technology, feedback methods in the area of English writing have gained new dimensions. One of these innovative dimensions involves the integration of both peer feedback and Web-based collaborative platforms such as wikis into English-writing classes (Vahedipour & Rezvani, 2017). The central aim of the current study has been to examine whether wikis have a positive effect on the grammatical and lexical accuracy of learners' English-language writing. The study involved 26 female second-year secondary-school learners. They were divided into two groups: the experimental group (n=14) was engaged in online collaborative writing and peer feedback using a wiki, while the control group (n=12) was engaged in traditional writing and received teacher feedback. Each participant's two individual writings (one for the pre-test and the other for the post-test) were subjected to an error analysis. The study has concluded that there were improvements in experimental group's grammatical accuracy, but not their lexical accuracy. However, the treatment (the use of a wiki) reduced the learners' total errors in this group to a far greater extent than was the case in the control group. This study's findings support the argument that collaborative writing and peer feedback via wikis can promote correct English-language writing in students. Moreover, the study contributes to the expanding body of evidence examining and identifying the positive influence that wikis have on the grammatical and lexical accuracy of EFL learners' writing. The findings highlight the importance of integrating technology into EFL classes in general and into EFL-writing classes in particular. Obviously, wikis can be a beneficial tool for both teachers and students. Through the integration of wikis into classroom curricula, EFL teachers can greatly benefit their students. Wikis

not only motivate students to write well but also reduce the workload burden faced by teachers. Therefore, it is essential to expand the infrastructure and the technological tools needed for ICT use in classrooms.

6.1 Limitations of the Study

As with all studies, the present one has several limitations. Below are the four most important limitations:

1) The researcher was unable to use a placement test to put the participants into a group that corresponded to their English-language proficiency levels. Thus, the samples likely had a mixed level of proficiency, which amounted to an extraneous variable capable of muddying the results.

2) Students did not receive enough training prior to the experiment, and this deficit might have led to under-performance. Specifically, some students still did not know how to provide peer correction or how to use the correction codes. Hence, researchers conducting similar studies would do well to provide all participants extensive training before the start of the experiment.

3) The treatment was administered on the sixth week of the academic year, which coincided with students' exams and project due-dates. As a result, the students did not spend enough time collaborating with one another. Thus, researchers should keep in mind the time element before they begin their study's treatment.

4) The duration of treatment was only two weeks, which was very short and may have been inadequate for this study. The briefness of the treatment might have weakened the results. Therefore, it is suggested that a longitudinal study be conducted to determine whether the positive effects of a given treatment increase as the duration increases.

6.2 Recommendations

Based on the study's findings, the following six recommendations can be made:

1) Future research may explore teachers' perceptions of wikis as collaborative-writing tools and discover the obstacles that hinder the implementation of wikis in EFL contexts.

2) Future studies can strengthen the generalizability of the literature's findings by examining different contexts, such as public schools, schools where teachers face reasonable workloads, and schools where students exhibit a high degree of commitment to their tasks.

3) Future research investigating the effects of wikis on EFL learners' writing can extend the study over a long period of time or can measure the effects through a post-delayed test.

4) Most research has explored the effects of wikis on learners' writing. Therefore, researchers may want to diversify the pool of findings by exploring different language skills, such as reading comprehension. Syllabus designers and material developers should identify the many tasks to which wikis can contribute a host of benefits, including improved ease-of-use, lower costs, and greater learner outcomes.

5) As research findings show, spelling remains a problematic area for EFL students. Researchers may examine whether wikis can counter this discouraging trend.

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Appendixes

Appendix A: Pretest and Post Writing Test

Name ………………… Group ………………………

Write a short essay about:

The importance of technology in our lives

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Appendix B: Rating Table

Grammatical errors	Definition	Example
Verb tense	It includes missing or wrong tense markers and the modals, which mark tense such as, can/could.	I **attend** the concert last night. (attended)
Verb form	Any kind of error in the formation of the verb phrase, not including tense. (e.g. infinitives, and ill formed passives)	They hope **find** happiness. (to find)
Subject verb agreement	It is an error in noun or verb form leading to lack of agreement in number.	**Building houses** are tiring. (is)
Articles	It includes unnecessary, wrong, or missing articles or determiners.	Put book on **a** table. (Put the book on the table)
Noun endings	Includes missing or ill-formed plural or possessive markers.	**Magician** are tricky people. (magicians)

Pronouns	Pronouns that do not agree in number or case with its referent or that have no antecedent (only personal pronouns)	We should let **he** know before it is too late. (him)
Fragments	It is either a dependent clause used as a sentence or clauses with no subjects.	She said I hated the game. Which is not true.
Run-ons	The use of run-on sentences or comma splices.	In Egypt people are afraid to speak about their personal life, people from Africa like to express their feelings.
Word choice	Includes the use of wrong verb, modal, preposition and relative pronoun.	In addition **of** money…(to)
Misspelling	---------	Beautifull instead of Beautiful
Semantic	Confusion of sense relations and collocational errors.	My favorite **plate** is pasta and rice (dish).
		My **uncle**'s name is Ana (aunt).
		In my city, there are **very** shops (many).
		This movie is totally cool [totally awesome is more preferable]

Appendix B is adapted from Ferris (2003) and modified by adding two lexical errors.

Appendix C: Error Analysis Form

Error type	Number of errors	Ranking *
Verb tense		
Verb form		
Subject verb agreement		
Noun endings		
Article/determiner		
Fragments		
Run-ons		
Pronouns		
Word choice		
Misspelling		
Semantics		

Appendix C is adapted from Ferris (2003) and modified by adding two lexical errors.