

The Effectiveness of Using Twitter in Developing EFL Saudi Female Students' Grammatical Knowledge

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Abstract

The increasing popularity of social networking sites has tempted computer-assisted language learning (CALL) researchers to investigate their potential uses for language learning. Accordingly, this mixed methods experimental study aimed to determine the extent to which Twitter is effective in developing EFL Saudi female students' grammatical knowledge, specifically their receptive and productive grammatical knowledge. It also investigated students' perceptions of using Twitter to learn grammar. Fifty-five Saudi female students majoring in the English language at a Saudi university were divided into an experimental group (n=26) and a control group (n=29). The analysis of the pre- and post-tests indicated that Twitter was generally effective in developing the students' productive but not receptive grammatical knowledge and its effectiveness differed based on the grammatical structures being taught. The data from the interviews revealed that the students generally had positive perceptions of using Twitter to learn grammar although they had some concerns. The study concluded with some pedagogical implications, in light of the study's findings, and some recommendations for future research.

Keywords: *Computer Aided Instruction, Young Adult, Higher Education, Twitter and social media.*

Introduction

In the wake of technological evolution, various Web 2.0 tools have emerged and have been used widely by many users. Web 2.0 is a term that refers to “a Web technology that aims to enhance creativity, information sharing and collaboration among users” (Tu et al., 2008, p. 336). Web 2.0 tools include blogs, wikis, and social networking sites on which users can read and create content and collaborate (Lomicka & Lord, 2009; Wang & Vasquez, 2012; Warschauer & Grimes, 2007). Social networking sites are one useful aspect of Web 2.0. Even though they are not explicitly designed for language learning, the increasing popularity of social networking sites has tempted computer-assisted language learning (CALL) researchers to investigate their potential pedagogical uses and encouraged language teachers to use such platforms to optimize the teaching process (Zourou, 2020). It has been claimed that using social networking sites for language learning offers great potential to enhance students' engagement and motivation, as well as their achievement (Akbari et al., 2016). Twitter, which is the focus of this study, is rated as one of the most investigated social media platforms by CALL researchers (Barrot, 2021; Solmaz, 2018). Given the prevalence of Twitter and the potential it promises for

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language learning (Lomicka, 2017), learners can use it to practice and develop different aspects of language, including grammar.

Grammar is an essential part of the language used in everyday communication and without it, speakers would not be able to exchange meaningful linguistic messages (Batstone, 1994; Cameron, 2001; R. Ellis, 2008; Palmer, 1983). In relation to Twitter, teachers can use Twitter to teach grammar to language learners. Using Twitter, students can write brief messages to practice writing grammatically correct sentences. They can also do various grammar-related activities in an interactive environment.

Statement of the Problem

Though grammar is an integral part of a language, unfortunately, recent evidence suggests that EFL students perceive grammar to be one of the most difficult aspects to learn (Jiménez, 2018). To overcome difficulties with learning grammar, teachers can use different teaching strategies, such as using different technologies to teach grammar has been found to be effective (Heift & Vyatkina, 2017). Social networking sites are one of the technological phenomena that have become increasingly popular among millions of users.

Given the widespread popularity of Twitter in Saudi Arabia (Statista Research Department, 2022), a few studies have examined Twitter's effectiveness in helping Saudi learners develop different language skills, such as writing (e.g., Al Harbi, 2016) and vocabulary (e.g., Alqunayer, 2016). However, to the best of the researcher's knowledge, no study has investigated the use of Twitter for learning grammar in the Saudi context. Hence, applying Twitter-based grammar instruction may address the gap in the literature

Purpose of the Study

Given the aforementioned potential use of Twitter for language-learning purposes and the rationale developed in the previous sections, this mixed methods study aims to determine the extent to which Twitter is effective in developing Saudi students' grammatical knowledge, specifically their receptive and productive grammatical knowledge. Another objective of this study is to explore Saudi female students' perceptions of using Twitter to learn grammar.

Research Questions

The following three research questions guide the study:

1. To what extent is Twitter effective in developing EFL Saudi female students' receptive grammatical knowledge?
2. To what extent is Twitter effective in developing EFL Saudi female students' productive grammatical knowledge?
3. What are EFL Saudi female students' perceptions of using Twitter to learn grammar?

Significance of the Study

This study is significant for both theoretical and practical reasons. Theoretically, this study is intended to provide further information about the effect of Twitter on the grammatical knowledge of EFL learners and their perceptions of using Twitter to learn grammar. Practically, this study may be beneficial to many people in the fields of applied linguistics and foreign language instruction. To be more precise, the findings of this study may be useful to people who are interested in the intersection of technology and language teaching and learning, including EFL instructors, learners, and curriculum designers.

Theoretical Background

The approach adopted in this study consists of helping learners notice the use of grammatical structures by directing their attention to them through input enhancement, as

well as encouraging learners to practice these structures by expressing their thoughts and feelings and doing grammar-related activities on Twitter. Schmidt (1990, 2001, 2012) hypothesized that language forms (input) are not acquired (converted to intake) unless they are noticed. He defined intake as “that part of the input that the learner notices” and claimed that consciously noticing language forms in input, either deliberately or inadvertently, is the necessary condition for the conversion of input to intake (Schmidt, 1990, p. 139). Schmidt (1993) argued that increasing the saliency of language forms can draw learners' attention to these forms and enhance noticing. This can be reached by increasing the frequency of those forms (N. Ellis, 2002) and input enhancement (Sharwood-Smith, 1993). Input can be enhanced by increasing the number of times students are exposed to the target forms (i.e., “input flooding”) or by “textual enrichment,” in which the instructor modifies the typographical features of a text to make the target forms more salient (Larsen-Freeman & DeCarrico, 2019).

Even though explicit explanations are considered beneficial in directing learners' attention to input (Sharwood-Smith, 1993), the role of explicit and implicit knowledge in language learning has been controversial for decades. For some scholars, explicit knowledge plays a crucial role in constructing implicit knowledge. This assumption is known as the strong-interface model, which assumes that explicit knowledge can be converted to implicit knowledge with time and practice. Within this model, the relationship between explicit and implicit knowledge is viewed as “a transformational one” (Gascoigne, 2018, p. 2).

Literature Review

Grammatical Knowledge

The Conceptualization of Grammatical Knowledge

In order to provide a clear depiction of what “grammatical knowledge” means, L2 scholars have proposed several conceptualizations of linguistic knowledge in which grammar plays a crucial role, which have been used as guidance for constructing grammatical assessments (Purpura, 2014). One model was proposed by Bachman and Palmer (1996), who conceptualized language knowledge in terms of organizational knowledge and pragmatic knowledge. Another well-known conceptualization of language knowledge was proposed by Lado (1961), which measures L2 learners' proficiency in terms of their ability to use three language elements (i.e., knowledge of phonology, structures, and lexis) in the context of the language skills (i.e., listening, reading, speaking, and writing; Purpura, 2004, 2014).

More recently, Purpura (2004, 2012) proposed a comprehensive model of grammatical knowledge, conceptualized in terms of the associations between grammatical forms and their semantic meanings. For example, considering the form and meaning dimensions of L2 proficiency, the affix –ed added to an English verb is a grammatical form associated with the past (i.e., its semantic meaning). In general, most conceptualizations of grammar consider the relationship between form and meaning.

Measurement of Grammatical Knowledge

For decades, the place of grammar within language instruction has been the source of much debate (Cullen, 2012; R. Ellis, 2002; Purpura, 2004; Richards & Reppen, 2014). Some educators advocate explicit grammar teaching while others argue that grammar is best taught implicitly or naturally (Cullen, 2012; R. Ellis, 2002; Purpura, 2004; Richards & Reppen, 2014). These distinctive views about grammar teaching are closely related to the type of assessments teachers employ to elicit students' grammatical knowledge (Purpura, 2004). Therefore, types of assessments used within explicit grammar teaching are different from those used within implicit grammar teaching.

Another categorization of grammar assessment is based on whether the type of knowledge assessed is receptive or productive. Based on the responses examinees need to produce, Purpura (2004, 2012, 2014) divided tasks used to assess grammatical performance into selected response (SR) tasks and constructed response (CR) tasks. SR tasks provide insights into examinees' receptive grammatical knowledge (e.g., recognition or recall). By contrast, CR tasks allow testers to make inferences about examinees' productive knowledge. CR tasks are further divided into limited production (LP) tasks, which assess examinees' emergent knowledge of a particular learning point, and extended production (EP) tasks, which assess learners' overall L2 performance. Table 1 illustrates the ways of assessing learners' grammatical knowledge (Purpura, 2014, p. 14).

Table 1. Ways of Eliciting Grammatical Performance

		Type of tasks		
SR tasks	CR tasks			
	LP tasks	EP tasks		
		Product-focused	Performance-focused	Process-focused
<ul style="list-style-type: none"> • noticing (circle the verbs) • matching • same/different • true/false • agree/disagree • multiple choice • error detection • ordering • categorizing • grouping • judgment tasks 	<ul style="list-style-type: none"> • labelling • listing • gap-filling • cloze • sentence completion • discourse completion task (DCT) • short answer • sentence reformation 	<ul style="list-style-type: none"> • essay • report • project • poster • portfolio • interview • presentation • debate • recital • play 	<ul style="list-style-type: none"> • role play • improvisation • interview • retelling • narration • summary • info gap • reasoning gap • opinion gap • jigsaw • problem-solving • decision making • interactive DCT 	<ul style="list-style-type: none"> • observation with rubrics, checklists, anecdotal reports • self-reflection with journals, learning logs, think-alouds

Note. From "Assessing Grammar," by J. Purpura, in A. J. Kunnan (Ed.), *The Companion to Language Assessment* (p. 114), 2014, Wiley-Blackwell. Copyright 2014 by Wiley-Blackwell.

L2 Grammar Teaching and Learning

There is a general consensus among linguists that grammar is central to language teaching (Nassaji, 2017). Notwithstanding this agreement, there has been a persistent debate whether grammar is learned intentionally or acquired through unconscious processes when learners are exposed to meaningful input. In other words, there is considerable controversy among linguists whether grammar is instructed or naturalistic. Some scholars claim that students can develop comprehensive grammatical knowledge through traditional teaching methods that focus on grammar as an isolated collection of rules taught independently from authentic written or spoken language (Williamson & Hardman, 1995). On the other hand, some scholars believe that language is learned holistically with no need for purposeful grammar instruction (Canale & Swain, 1980; Krashen, 1981).

The study of the roles of explicit and implicit learning in second language acquisition (SLA) is mainly motivated by cognitive psychology (R. Ellis, 2009; Nassaji, 2017). Implicit learning takes place without consciousness (i.e., unintentionally), whereas

explicit learning takes place through conscious processes (i.e., intentionally). Over decades, different teaching approaches addressing either explicit or implicit grammar teaching have emerged. For example, R. Ellis (2016) distinguished between “focus on form,” which is typically implicit grammar instruction, and “focus on forms,” which involves explicitly drawing learners’ attention to specific grammatical forms. Focus on form instruction may be pre-planned, in which learners are provided with oral or written texts involving pre-determined grammatical forms, or incidental, in which grammatical forms arise spontaneously during interaction (R. Ellis, 2016; Loewen, 2018). By contrast, focus on forms instruction represents traditional language teaching in which teachers provide students with explicit and direct explanations of discrete grammatical forms based on structural syllabus (R. Ellis, 2016; Loewen, 2018).

However, many studies have proven the effectiveness of explicit grammar instruction over implicit grammar instruction (R. Ellis, 2006; Nassaji, 2017). Some scholars mentioned some factors that affect grammar learning, such as time, frequency of grammatical structures, and implementing interactive activities rather than decontextualized drills. From another point of view, Folse (2016) argued that teachers’ focus on grammar strongly depends on students’ needs.

Twitter as a Pedagogical Tool

Though Twitter is a social networking site that is not specifically designed for language-learning purposes, it can be a helpful tool to facilitate the learning process (Hattem & Lomicka, 2016). Due to its flexibility, educators can use Twitter in various ways to accomplish different learning goals (Cho & Rangel, 2016). The literature has revealed many possible uses of Twitter and reasons for its potential in language education. For example, Twitter provides an interactive environment where users can be engaged in social interactions revolving around academic issues (Lomicka, 2017). Twitter is often used to facilitate asynchronous, frequent, and prompt communication between users, including language learners (Bista, 2015; Dunlap & Lowenthal, 2009). Because of these features, it can also be an effective tool for enhancing learners’ motivation and engagement (Borau et al., 2009; Evans, 2014; Kelly, 2019). Furthermore, Twitter can enhance information sharing among students and teachers, as it provides a more comfortable medium than the traditional classroom, and enables teachers to keep in touch with their students outside of working hours (Malik et al., 2019; Chawinga, 2017). Twitter has proven to be effective in enhancing students’ participation, as it encourages shy students to express their ideas without being afraid of “losing face,” which can happen in face-to-face interactions. Thirdly, the 280-character limit of tweets encourages students to think critically to express their ideas briefly and accurately.

Despite the aforementioned advantages, some challenges of using Twitter as a learning tool have been identified in the literature. Lomicka (2017) pointed out that though the use of Twitter is prevalent, there are some challenges of using it to learn a language. One challenge is whether teachers can employ Twitter effectively and find tasks that meet both curriculum requirements and students’ needs. Another challenge teachers face is finding “an effective yet creative use of hashtags for ... microblogging tasks” (Lomicka, 2017, p. 8). Also, despite the rapid flow of information that is easily accessible by educators as well as students, the profound volume of tweets can create a sense of information overload (Cho & Rangel, 2016). Some other challenges include technical problems, such as the lack of an Internet connection and the high cost of mobile data (Luo et al., 2017).

In conclusion, although there are some challenges associated with its implementation, the interactive environment that Twitter provides can bring significant advantages for language learning and teaching. Moreover, its popularity and convenient usage make it easy to adopt.

Twitter-related Studies

The literature on Twitter, the focus of this study, in relation to L2 instruction is limited compared to that on other Web 2.0 tools. Some studies were conducted in EFL contexts while fewer studies investigated the use of Twitter in ESL contexts.

Some studies on Twitter-based learning have examined its effectiveness in developing literacy skills. Using a one-group experimental design, Abdallah (2018) questioned whether an instructional microblogging model based on Twitter affects EFL student teachers' critical reading and summarization skills at an Egyptian university. The results indicated that the students' critical reading and summarization skills significantly improved after using Twitter. In Abdallah's (2018) study, the students reported that Twitter helped them in improving their critical reading and summarization skills because of its ease of access and use and its interactive. Similarly, Espinoza-Celi and Pintado (2020) and Ayu et al. (2021) found that Twitter-based writing had a positive effect on students' writing skills. Despite these positive results, Abdallah's (2018), Espinoza-Celi and Pintado's (2020), and Ayu et al.'s (2021) studies did not include comparison groups that used another teaching method, which could have affected the results. By contrast, at a Saudi university, Al Harbi (2016) compared the effect of Twitter-assisted learning and traditional learning on EFL students' literacy skills (i.e., reading and writing) and motivation. He gave pre- and post-tests of writing performance to two groups of 60 students. The results indicated that the reading and writing skills of both the control and experimental groups improved; yet, when comparing the mean scores of the groups, the experimental group exceeded the control group. Twitter was found effective not only for improving students' writing skills but also for decreasing their writing anxiety (Alam & Habib Shah, 2020)

However, a handful of studies on Twitter-based writing have involved teachers or instructors. In the Saudi context, Althobaiti (2020) explored the usability of Twitter for enhancing EFL writing skills from instructors' perspectives. Results reported that the instructors' perceptions were positive with respect to learner autonomy, accessibility, linguistic and metalinguistic accuracy, and the affective domain respectively.

Also, very few studies have attempted to investigate the correlation between the use of Twitter and English vocabulary development. At a Saudi university, Alqunayeer (2016) looked at the vocabulary improvements that EFL students can make by using Twitter. She investigated the effectiveness of Twitter compared to traditional strategies. The comparison of the groups yielded a statistically significant difference between the post-test and achievement test scores of the experimental group (i.e., those who were taught using Twitter) and the comparison group (i.e., those who were taught using traditional strategies) in favor of the experimental group.

Previous research has indicated that Twitter-based instruction has a positive impact on EFL students' pronunciation (Ataeifar et al., 2019; Kartal & Korucu-Kis, 2019; Mompean & Fouz-González, 2016). Using a one-group experimental design, Mompean and Fouz-González (2016) conducted a study of students learning English at an official language school in Spain to investigate the extent to which Twitter can be effective in developing their English pronunciation and engagement. They concluded that Twitter had a positive effect on the students' pronunciation, engagement, and participation. Similarly, Ataeifar et al. (2019) integrated two mobile applications (i.e., Twitter and Voice Thread [VT]) into EFL classes in Iran to examine their effects on learners' speaking proficiency and their perceptions of mobile-assisted language learning. They divided the students into two experimental groups and a control group: One experimental group used Twitter and the other used VT while the control group used traditional learning. The researchers found that the experimental groups outperformed the control group. The results also showed that the participants liked using the mobile applications to improve their pronunciation.

It seems that Twitter-related studies in ESL contexts were mostly devoted to investigating its impact on students' performance and perceptions in composition courses (Harrell,

2016; Phillips, 2016; Reynolds-Srot, 2018). A study conducted by Harrell (2016) focused on students' understanding of the writing process and how Twitter can be used to scaffold writing. Harrell (2016) assigned his students three tasks to teach them rhetorical moves necessary for writing academic texts. The results of the study showed that using Twitter for teaching rhetorical moves was effective. In the same fashion, Phillips (2016) published a paper titled "Networked Digital Spaces: Twitter in the Composition Classroom," in which she presented a sample method for integrating Twitter into a first-year composition class and observed how her students interacted with Twitter. After analyzing the students' interaction through Twitter, Phillips (2016) found that Twitter enhanced students' engagement and encouraged them to interact with each other. However, she indicated that students mostly used to interact with each other rather than the larger community (i.e., other users of Twitter). Therefore, Phillips (2016) indicated that she would ask her students to interact with other users of Twitter (i.e., rather than their classmates) in future work.

Similarly, Reynolds-Srot (2018) carried out a study to investigate the effect of using Twitter in a composition course on ESL students' perceptions and usage of it. She also questioned whether the use of Twitter can improve ESL students' writing. Results demonstrated that the students' perceptions of Twitter as a platform mainly devoted to social interaction changed after being engaged in the composition course as they became more aware of its potential as a writing resource. She also found that Twitter helped the students to write creatively using changing rhetorical modes.

Methodology

Research Design

This study used a mixed methods approach to answer the research questions. Specifically, a mixed methods experimental design was used in this study to examine the effectiveness of Twitter in developing the grammatical knowledge of EFL students and investigate their perceptions of using it to learn grammar. In this type of mixed methods design, researchers embed qualitative data within an experiment to enhance it (Creswell & Clark, 2018).

The quantitative data were collected using a quasi-experimental design to find out the extent to which Twitter is effective in developing the receptive and productive grammatical knowledge of EFL students. To address the third research question, which investigated the students' perceptions of using Twitter to learn grammar, semi-structured interviews with the participants were conducted after the quasi-experiment had finished.

Participants

The participants of this study were EFL Saudi female students majoring in the English language at a Saudi university. They were in their second year of college and were taking an English writing course. It is supposed that they had previously completed three grammar courses. Furthermore, all of them had previously completed three writing courses and were enrolled in an academic writing course, which is designed for intermediate students. Thus, the participants had reasonable levels of English proficiency for the purposes of this study. A writing course was chosen over a grammar course so that the researcher would not be restricted to the topics covered in a grammar course.

The Academic Writing course included three sections, and two sections were chosen to represent the experimental and control groups because their classes were on the same day, which made it easier for the researcher to schedule the procedures of the study. The first group represented the control group and included 47 students, while the second group represented the experimental group and included 43 students. Only 29 in the control group and 26 in the experimental group volunteered and completed the requirements of

the study. The students were all Saudi native speakers of Arabic who were studying English as a foreign language, which indicates their homogeneity. Because of availability, all the participants in this study were female, so gender was not a confounding variable.

Instruments

Pre- and post-tests

Based on Purpura's (2004, 2012, 2014) aforementioned model, the pre- and post-tests used in this study consisted of two sections. The first section included multiple-choice questions and assessed students' receptive grammatical knowledge. The items in this section were adopted or adapted from items created by Azar (2002, 2003), Murphy (2004), Azar and Hagen (2006), and Singman (2012). Singman (2012) modified the TOEIC Test Grammar and Vocabulary Review (n.d.) which was "produced by TOEIC faculty at the University of California to test students' grammar comprehension abilities" (p. 54).

The target grammatical structures included subject–verb agreement, prepositions, articles, verb tenses, conjunctions, relative pronouns, and word forms. Subject–verb agreement, prepositions, and articles have been found to be common grammatical errors in intermediate EFL students' writing (Karimi & Fotovatnia, 2012). Moreover, Arabic students encounter difficulties with subject–verb agreement, prepositions, articles, and verb tenses (Khalil, 2020). Specifically, subject–verb agreement, prepositions, articles, verb tenses, and word forms are considered problematic grammatical structures for EFL students in the Saudi context (Althobaiti, 2014). Furthermore, subject–verb agreement, articles, verb tenses, and word forms are viewed by EFL teachers as grammatical structures that are necessary for writing (Suthiwartnarueput & Wasanasomsithi, 2012). Errors regarding relative pronouns are common among Arabic English language students due to L1 transfer (Alasfour, 2018). Moreover, Tustada (2019) indicated that EFL students are not entirely able to use conjunctions, resulting in poorly structured or confusing sentences. For these reasons, paying close attention to the accurate use of these grammatical structures is crucial for receptive and productive grammar.

In the second section of the tests, which assessed students' productive grammatical knowledge, the students were asked to write a short essay, consisting of at least three paragraphs including an introduction, body, and conclusion. The tasks used in the pre- and post-tests were used by Wu (2015) because they are "closely related to participants' life experience" (p. 112).

Interviews

In order to answer the third research question, the researcher used semi-structured interviews to get detailed information about the participants' perceptions of using Twitter to learn grammar. Most of the interview questions were adapted from those created by Pham and Usaha (2016), Ghorbani and Ebadi (2019), and Moghari and Marandi (2017). Questions 4, 5, 7, 8, and 13 were adapted from questions developed by Pham and Usaha (2016). Questions 1, 6, 11, 14, and 15 were adapted from Moghari and Marandi (2017) and Questions 2, 3, and 12 were adapted from Ghorbani and Ebadi (2019). The remaining questions—Questions 9, 10, and 16—were designed by the researcher.

The interviewees were chosen by inviting all the participants in the experimental group to semi-structured interviews at the beginning and end of the study. Thirteen students volunteered to participate and all the volunteers were interviewed. To enhance the credibility of interview results, researchers recommend using member checks (Brown, 2009). The transcriptions were sent to the interviewees to check their accuracy and make any required modifications.

Data Collection Procedures

The study lasted six weeks from February 2022 to March 2022. The researcher introduced the Twitter account on which the activities would be posted to the students. The students in both groups were given approximately one hour to complete the aforementioned pre-test in order to determine their receptive and productive grammatical knowledge before receiving the treatment.

Then, the students in both groups participated in multiple grammar activities based on Purpura's (2004, 2012, 2014) aforementioned model. They were required to complete them every day, except for Friday and Saturday as they are weekend days in Saudi Arabia. For the experimental group, the researcher posted tweets that included activities or prompts related to particular grammatical structures or forms, either explicitly or implicitly. The students were asked to post their answers as replies to the tweets including activities. Figure 1 presents a screenshot of a student's answer to a Twitter-based productive grammar activity, and Figure 2 presents a screenshot of a student's answer to a Twitter-based receptive grammar activity.



Figure 1. Answer to a Twitter-Based Productive Grammar Activity

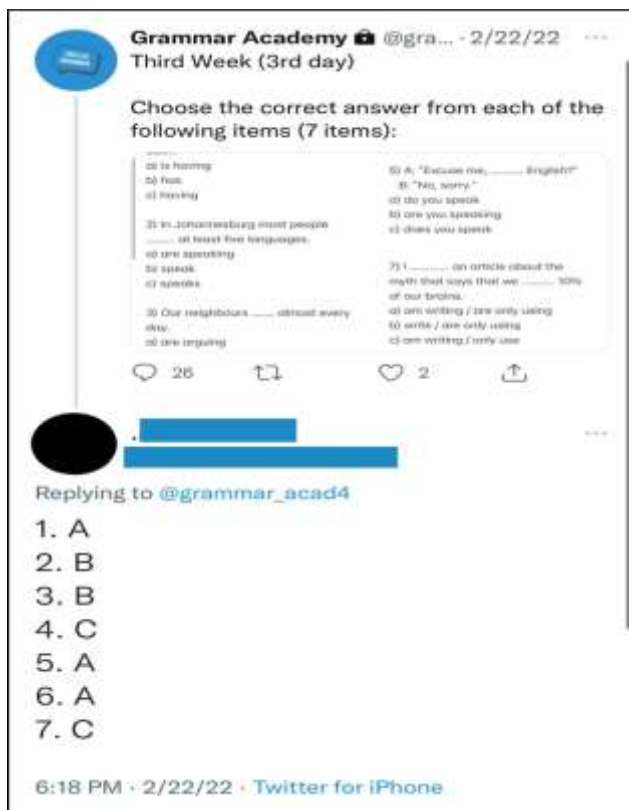


Figure 2. Answer to a Twitter-Based Receptive Grammar Activity

The control group was given the same activities and prompts as the experimental, but they were required to write down the answers individually and return them during the next class. Each week's paper was divided into days; the students were required to complete the activities daily.

At the end of the experiment all the participants completed a post-test in order to determine the effect of the treatment. Then, after the experiment was completed, 13 volunteers from the experimental group were interviewed individually via Zoom to understand their perceptions of the approach implemented in this study (i.e., using Twitter to learn grammar). All the interviews were conducted in Arabic, which was the interviewees' mother tongue, to allow them to express their ideas easily and freely. Each interview lasted 30 to 50 minutes and was audio-recorded. It is worth mentioning that permission to record the interviews had been granted by the students before starting data collection.

Data Analysis Procedures

Quantitative Data Analysis

In order to answer the first research question, the data obtained from the first section of the pre- and post-tests (i.e., the multiple-choice questions [MCQs]) were analyzed. Each item was scored out of one point. Thus, the maximum score was 34 and the minimum score was zero. To answer the second research question, the second section of the pre- and post-tests (i.e., essays) were analyzed. Using content analysis, the participants' essays were analyzed in terms of grammatical errors. The researcher looked for grammatical errors and highlighted, tabulated, and quantified them, focusing on the grammatical points under investigation and ignoring other types of error.

The taxonomy suggested by Kampookaew (2020) was used as a correction guideline because it is clear and includes most of the target grammatical structures covered in this study. However, Kampookaew's (2020) taxonomy does not include some errors related to

verb tense. Thus, the researcher added a fourth category to the correction guideline, referred to as misformation, as suggested by Bialystok et al. (1982). Kampookaew's (2020) taxonomy also does not include errors related to relative pronouns. Therefore, the general classification of errors that Kampookaew (2020) used to classify other types of errors was used to analyze errors related to relative pronouns; this included misuse, addition, and omission. However, the participants did not make errors with conjunctions on the pre- and post-tests. Therefore, conjunctions were excluded from the analysis. Figure 3 shows the correction guideline used to assess the participants' productive grammar (i.e., essays).

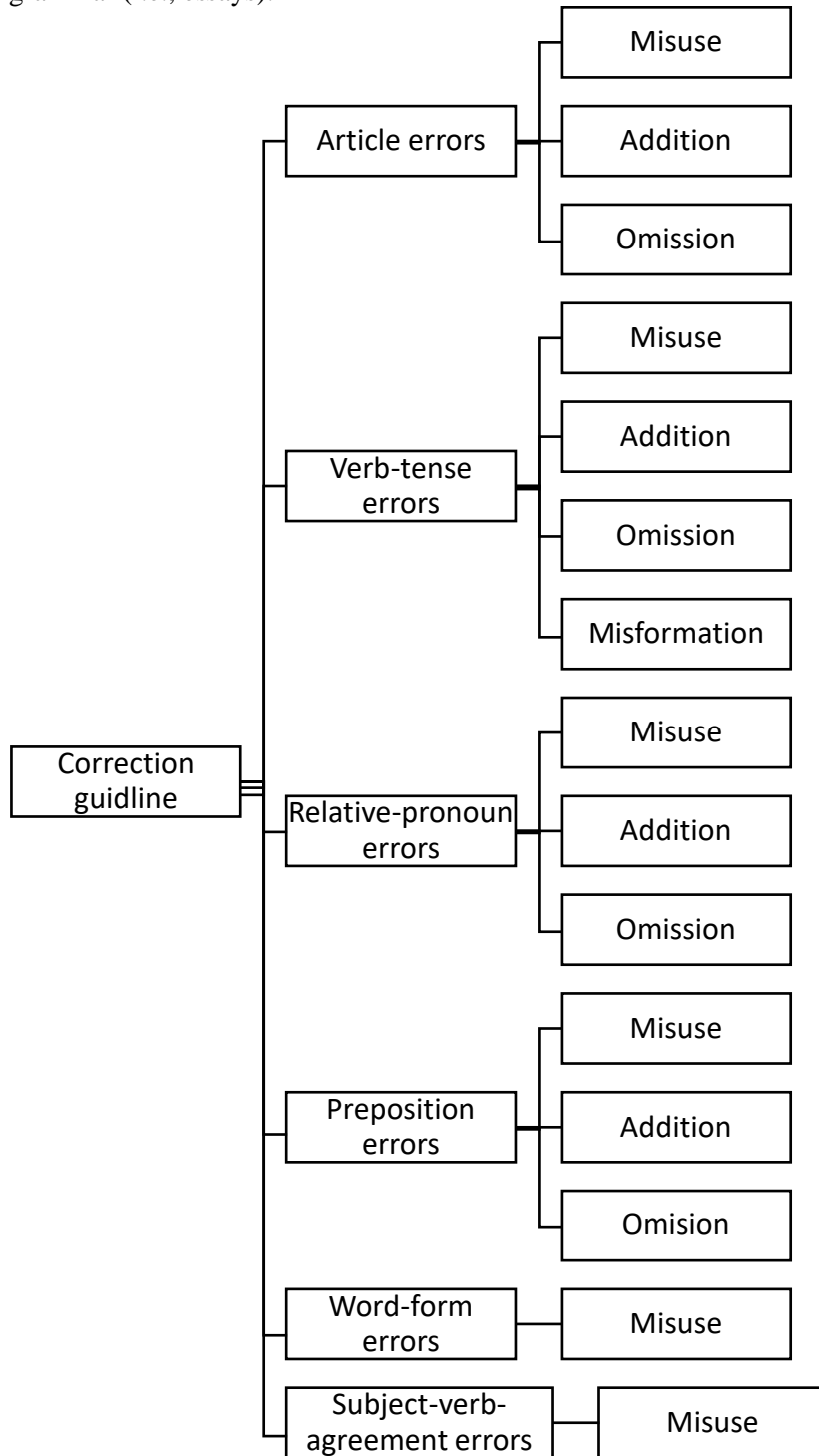


Figure 3. Correction Guideline for the Participants' Productive Grammar

The quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS). The participants' scores on the first section of the pre- and post-tests and the number of grammatical errors they made on the second section of the pre- and post-tests were analyzed using descriptive statistics (i.e., frequencies, mean, standard deviation, and percentage change). Furthermore, gain scores were used to determine the extent to which the students' receptive grammatical knowledge changed while the difference in the number of errors was used to find out the change in the participants' productive grammatical knowledge.

Qualitative Data Analysis

The qualitative data (i.e., data from the interviews) were analyzed using reflexive thematic analysis. In this study, the data were analyzed inductively, which means that the codes were data-driven. Inductive coding is a bottom-up approach, in which researchers allow the themes to emerge from the data, rather than theories or existing knowledge (Braun et al., 2019; Terry et al., 2017). The researcher chose to use inductive coding to reflect the richness of the participants' views and capture their experiences and perceptions.

After analyzing the interviews, the researcher translated the parts that were used as quotations in the results chapter into English. The reason for analyzing the interviews in their original language was to preserve the original meaning as expressed by the participants. Finally, the translated quotations were checked by an experienced translator. To ensure the students' privacy, their identities were anonymized; therefore, pseudonyms were used to refer to the participants in the interviews.

Results and Discussion

The Effectiveness of Twitter in Developing EFL Saudi Female Students' Receptive Grammatical Knowledge

To answer the first research question, which addresses the extent to which Twitter is effective in developing EFL Saudi female students' receptive grammatical knowledge, the data obtained from the pre- and post-tests and interviews were analyzed. The students' scores on the first section (i.e., MCQs) of the pre- and post-tests were analyzed and compared using gain scores and percentage change. Table 2 summarizes the results of the receptive grammatical knowledge test for both the experimental and control groups.

Table 2. Results of the Receptive Grammatical Knowledge Test

Group	Pre-test		Post-test		Gain		Percentage change of the mean scores
	M	SD	M	SD	M	SD	
Experimental group	18.808	6.013	20.231	5.894	1.423	3.373	7.567%
Control group	18.552	4.372	20.103	4.135	1.552	3.089	8.364%

As Table 2 presents, in both groups, the mean receptive grammatical knowledge (i.e., MCQs) increased by the post-test, as indicated by the gain scores. Considering the experimental group, the students' mean receptive grammatical knowledge was 18.808 before the treatment and increased to 20.231 after the treatment (7.567%). Focusing on the control group, the students' mean receptive grammatical knowledge increased from 18.552, on the pre-test, to 20.103, on the post-test, (8.364%). This indicates that the increase was very slight in both groups even though some of the interviewees mentioned that they still remembered some of the grammatical structures they learned during the study because they encountered them via Twitter. Nevertheless, students are "relatively poor judges of their own learning" (Persky et al., 2020, p. 997). Thus, the students in both

groups experienced very slight development in their receptive grammatical knowledge. Therefore, it seems that Twitter is generally not sufficiently effective in developing EFL Saudi female students' overall receptive grammatical knowledge. The findings of the current study do not agree with those of previous studies, which found that Twitter was effective in developing reading, a receptive language skill, as learners made significant development because of Twitter (e.g., Abdallah, 2018; Al Harbi, 2016). However, these studies were not devoted to investigating Twitter's effect on grammar.

The results of this study are also contrary to Schmidt's (1990) noticing hypothesis and the strong-interface model. Schmidt (1990) hypothesized that language forms must be noticed to be acquired. Schmidt (1993) argued that when teachers increase the saliency of language forms, that makes them more possible to be noticed and, in turn, acquired. Increasing the frequency of language forms and the number of times students exposed to these forms can help learners notice them (N. Ellis, 2002; Sharwood-Smith, 1993). Furthermore, Larsen-Freeman and DeCarrico (2019) suggested that "textual enhancement," which includes modifying the typographical features of linguistic forms, is one of the ways that help in directing learners' attention to linguistic forms. Considering the strong-interface model, explicit knowledge can be transformed to implicit knowledge with practice. This differs from the findings presented here as the students experienced very slight development in their receptive grammatical knowledge although they used Twitter to practice many grammar-related activities, either explicitly or implicitly, for relatively five weeks.

It seems possible that these results are due to the short duration of the study, which did not allow the students to practice grammar intensively. Another possible explanation is that some of the students obtained high scores on the pre-test; therefore, they could not get much higher scores on the post-test. In addition, some of the interviewees mentioned that they were concerned about the distracting nature of Twitter, which could have negatively affected their focus. For example, Yara stated, "I become distracted when [learning] using paper-and-pencil ... I also became distracted on Twitter ... both [Twitter and paper-and-pencil] are distracting but Twitter is more distracting than paper-and-pencil learning." Many of the interviewees mentioned that they used the mobile application version of Twitter. Alfallaj (2020) demonstrated that distraction is one of the side effects of using smart devices in language education in the Saudi context. Moreover, a possible explanation for these results is the feeling of lacking confidence that one of the interviewees mentioned. Manar stated, "I benefited [from using Twitter to learn grammar], but felt nervous because ... my answers were public, so I had to focus [while answering the questions]." A lack of confidence might have negatively affected the students' performance during the intervention. Getie (2020) found that self-confidence is one of the factors that affect students' interest in learning English.

However, since the study involved seven grammatical structures, it was interesting to investigate possible differences in the effect of Twitter-based instruction on these structures. It was found that the students in the experimental group experienced a greater increase in receptive grammatical knowledge in terms of relative pronouns than the control group. Accordingly, concerning receptive grammatical knowledge, it seems that Twitter is more suitable for teaching relative pronouns. This can be attributed to some features of relative pronouns that distinguish it from the other grammatical structures included in the study. However, investigating these features is beyond the scope of the study.

The Effectiveness of Twitter in Developing EFL Saudi Female Students' Productive Grammatical Knowledge

To answer the second research question, which addresses the extent to which Twitter is effective in developing EFL Saudi female students' productive grammatical knowledge, the grammatical errors the students made on the second section (i.e., essays) of the pre-

and post-tests were analyzed. These errors were quantified and compared using the difference in the number of errors and percentage change. Besides the data obtained from the pre and post-tests, the data revealed from the interviews were analyzed. Table 4 summarizes the results of the productive grammatical knowledge test for both the experimental and control groups.

Table 4. Results of the Productive Grammatical Knowledge Test

Group	Pre-test		Post-test		Dif		Percentage change of the mean number of errors
	M	SD	M	SD	M	SD	
Experimental group	4.923	4.019	3.154	3.016	1.769	2.717	35.939%
Control group	4.448	2.487	3.552	1.744	0.897	2.440	20.156%

As shown in Table 4, in both groups, the mean number of errors in productive grammatical knowledge (i.e., essays) on the post-test was lower than that on the pre-test, as indicated by the difference in the number of errors, which indicates a sign of development. The mean number of errors the students made in the essays in the experimental group was 4.923 on the pre-test and decreased to 3.154 after the experiment (35.939%), whereas in the control group, the mean number of errors the students made in the essays decreased from 4.448, on the pre-test, to 3.552, on the post-test, (20.156%). The experimental group experienced a greater decrease in the number of errors in productive grammatical knowledge (i.e., essays) than the control group, which implies that the experimental group outperformed the control group.

The quantitative findings for Research Question 2 are substantiated by the qualitative results as well. Some of the interviewees noted that they still remembered some of the grammatical structures they learned during the study and attributed that to Twitter-based instruction. Therefore, it appears that Twitter assists EFL Saudi female students in developing their overall productive grammatical knowledge.

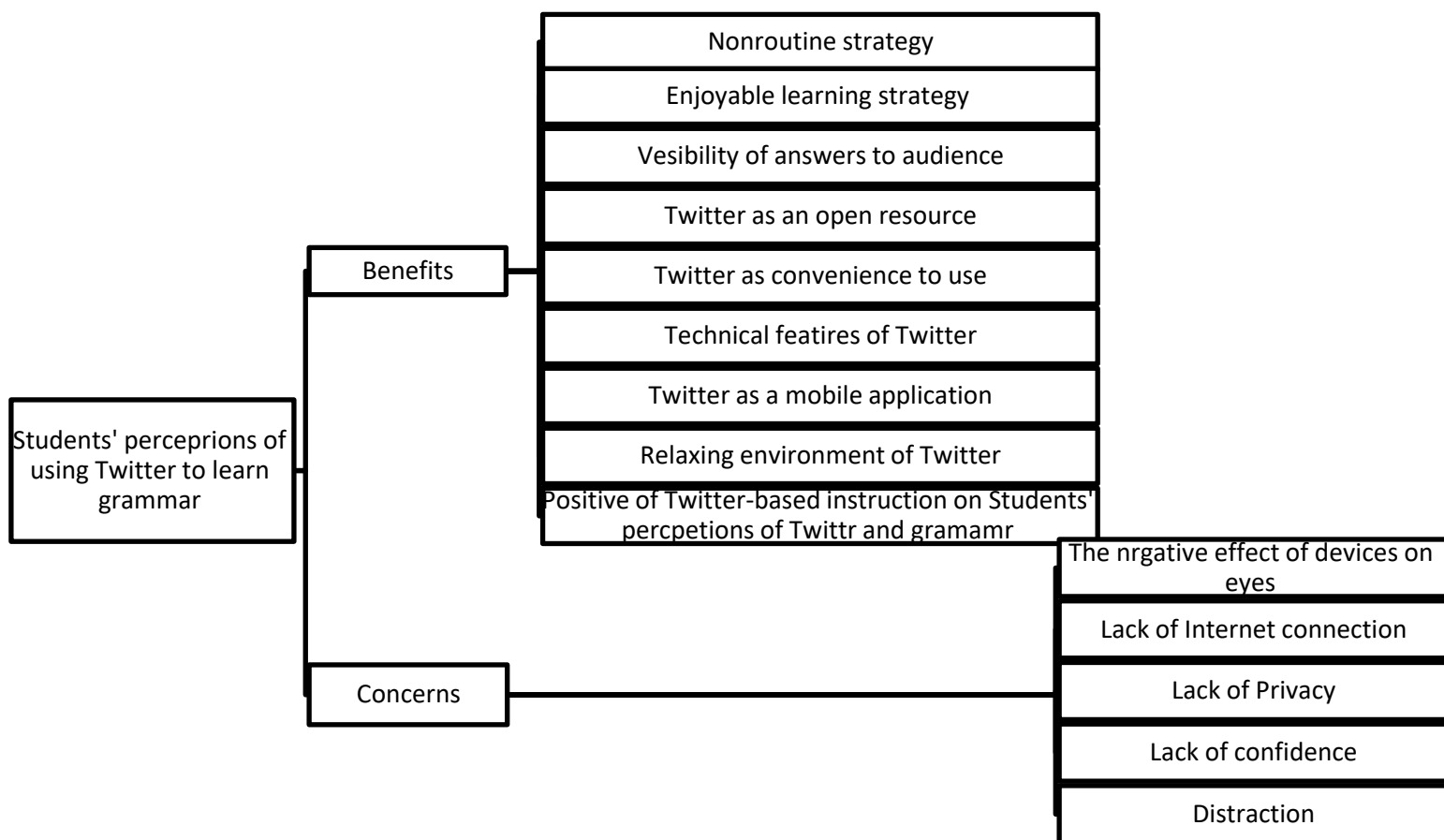
This goes hand in hand with the findings of a great deal of the previous work in Twitter-based language learning. It has been suggested that Twitter is effective in developing some productive language skills, including writing and pronunciation (Abdallah, 2018; Al Harbi, 2016; Ataeifar et al., 2019; Ayu et al., 2021; Espinoza-Celi & Pintado, 2020; Fouz-González, 2017; Kartal & Korucu-Kis, 2020; Mompean & Fouz-González, 2016). The findings of the current study also support Schmidt's (1990) noticing hypothesis and the strong-interface model. The students might have benefited from Twitter-based instruction because they wrote grammatical sentences and words in a new way that they had never experienced before. Many of the interviewees mentioned that this was their first time using Twitter to learn English.

However, it was interesting to see which grammatical structures experienced more development. The results indicated that the students in the experimental group experienced greater development in terms of word forms and verb tenses than the control group. These results can be attributed to two different factors. The first is that the students were asked to write more in the activities for verb tenses than they were for the other grammatical structures due to the nature of verb tenses, as they were asked to write sentences using different verb tenses, implicitly. Therefore, it seems that Twitter is more effective for developing grammatical structures associated with longer production activities. The second factor is that the productive activities devoted to word forms may have required more focus than those for the other grammatical structures. Thus, the students could overcome the concerns related to the distracting environment of Twitter.

EFL Saudi Female Students' Perceptions of Using Twitter to Learn Grammar

In order to answer the third research question, the data from the transcribed interviews were analyzed using reflexive thematic analysis. Some themes were developed, which addressed EFL Saudi female students' perceptions of using Twitter to learn grammar. The results are shown based on the themes that emerged from the data set. This is one of the strategies used to represent results in qualitative research (Cohen et al., 2018; Creswell, 2015). Overall, the results indicated that the students generally had positive perceptions of using Twitter to learn grammar. However, they had some concerns.

Benefits of Using Twitter to Learn Grammar



The data from the interviews indicated that using Twitter to learn grammar has some benefits. The interviewees mentioned many benefits that they thought Twitter brings to English grammar learning. Many of the participants reported that this was their first time using Twitter to learn English in general and grammar in particular. They indicated that they had never experienced using social media, particularly Twitter, in formal language learning. Layla, for example, stated, “I got bored of using paper-and-pencil ... I do all my assignments using paper-and-pencil, but Twitter is a new learning strategy for me ... so it is more enjoyable [than the paper-and-pencil strategy]. Primarily, it [using Twitter to learn grammar] might have been the main motivator [in this experience].” This finding is in line with that of Fouz-González (2017), whose participants indicated that they remembered the learning materials better because they encountered them via Twitter.

In addition, all the interviewees mentioned that they enjoyed using Twitter to learn grammar. They gave different reasons why they found using Twitter to learn grammar to be an enjoyable strategy. Rawan, for example, said that she enjoyed using Twitter to learn grammar because “it [learning grammar] is boring in the class. For example, the teacher just gives explanations [of some grammatical structures] or just distributes [papers with activities], and I write down the answers and give her the paper, and we [students] do not

enjoy [learning], while on Twitter, I feel that there is something enjoyable. I write, tweet, and reply to a tweet.” In accordance with the present results, previous studies have demonstrated that students perceive Twitter-based language learning to be enjoyable and interesting (e.g., Espinoza-Celi & Pintado, 2020; Kartal & Korucu-Kis, 2020).

As the students were required to complete the activities using the reply feature on Twitter, most of the interviewees referred to the availability of their classmates’ answers as an advantage. They indicated that they benefited from their classmates’ answers in different ways. The students checked their classmates’ answers to understand the intention of some questions that were not clear to them and could compare their answers and their classmates’ answers to evaluate their answers. Lubna mentioned that she checked her classmates’ answers to see which answers were more likely to be correct, which helped her to evaluate whether her answers were correct. In the same vein, Abdallah (2018) found that learners deemed Twitter useful for language learning because it allows “knowledge sharing” among them (p. 22). Besides the aforementioned advantages of the availability of classmates’ answers, some of the interviewees noted that seeing their classmates interact motivated them to do activities and become engaged in the learning process. For example, Hanan identified the role of Twitter in enhancing her motivation to learn grammar by saying, “I liked that I could see my classmates’ replies and how they were interacting. I think this motivated me to carry on [doing the activities].” These findings are in line with those of Al Harbi (2016), who found that Twitter considerably increased students’ motivation to practice literacy skills.

Some of the interviewees pointed out that they can return to the Twitter account whenever they want to revise particular grammatical structures or their answers to the questions. As noted by Yara, “I can return, even after this research is finished ... to the photos [in the tweets] to see why I chose this answer and correct my mistakes.” Yara liked that she can revise her answers, identify her mistakes, and correct them whenever she wants, as long as the Twitter account is available. Twitter permanently keeps the tweets created by users and never delete them unless they are deleted by account owners. However, no previous studies have mentioned this as an advantage or disadvantage. Another benefit of using Twitter to learn grammar that the interviewees mentioned was its convenience. Some of the interviewees mentioned that Twitter, itself, is convenient to use compared to some other websites. Espinoza-Celi and Pintado (2020), in this regard, pointed out that learners consider Twitter to be a convenient and user-friendly application. Some other interviewees, on the other hand, attributed the convenience of using Twitter to their familiarity with it. Similarly, Althobaiti (2020) found that Saudi EFL teachers perceive Twitter to be an effective tool for practicing writing because Saudi students are familiar with it. In addition, Fouz-González (2017) found that “the majority [of the participants] were already familiar with Twitter” (p. 21).

Another benefit of Twitter as a language-learning tool that was mentioned by the interviewees was that it contains various technical features that helped them in various ways. Yara, for example, used direct messages on Twitter to talk “with a student whose answers attracted me ... she benefited me ... we discussed a question [using direct messages on Twitter].” Direct messages were helpful, as Yara indicated, as she discussed some answers with her classmate. Rasha also mentioned that she used notifications because “I am a forgetful person ... notifications were very helpful for me [because] they reminded me of the activities.” Rasha indicated that she benefited from notifications as they continually reminded her to complete activities. Additionally, Sadeem reported that the like button helped her to “know whether I answered it [a question] or not.” Sadeem used the like button as a marker to know the last activity she finished so that she did not get confused about which she had finished and which were still remaining. The researcher noticed that the students used the like button and direct messages to contact her.

As there are two versions of Twitter, the website and the mobile application, the availability of Twitter on mobile devices was considered a benefit by some of the

interviewees. Using the mobile application, the students could take screenshots of tweets and highlight ambiguous points in that tweets. Also, accessing and dealing with information is easier using mobile devices than using paper-and-pencil. In the same vein, Abdallah (2018) found that students consider Twitter to be useful because they can access it via mobile devices. In addition, all the interviewees highlighted that the mobility of Twitter enabled them to participate in activities anytime and anywhere at their convenience. For example, Rula noted that using papers to learn grammar restricts learners to the time and place where the learning process takes place, while Twitter removes all these restrictions as learners can learn whenever and wherever they want, as she stated, "As it is Twitter [the learning tool], I can open it and answer [questions] ... if [the learning tools are] papers and a book [instead of Twitter], I have to be in a particular place and time, and I cannot hold them wherever I go." This finding is in agreement with Alharthi's (2016) findings, which showed that thanks to mobile devices, EFL learners can access Twitter whenever and wherever they want to learn English. Similarly, Althobaiti (2020) found that teachers attributed the usefulness of Twitter for practicing writing to the fact that students can practice writing at their convenience.

Some of the interviewees pointed out that Twitter provides a relaxing environment for learning grammar because traditional learning might be more stressful than Twitter-based learning. This result reflects that of Alam and Habib Shah (2020), who also found that Twitter assisted Saudi students "to cope with their writing apprehension" (p. 210). Students might feel more relaxed on Twitter because it is a platform that is not customized for language-learning purposes.

More interestingly, some interviewees argued that using Twitter to learn grammar affected their perceptions of grammar positively as grammar has become more important or more enjoyable for them. The students' perceptions of grammar might have changed because they were learning grammar using a new strategy and through favorable tools that might not be designed for learning purposes, which made it seem more important and enjoyable. Furthermore, some of the interviewees commented on how their perceptions of Twitter as a language-learning tool changed after using it to learn grammar. Twitter-based grammar learning drew the students' attention to the educational uses of Twitter that they were not aware about them before the study. In this respect, Reynolds-Srot (2018) observed that using Twitter for language learning can change students' perceptions of it as they become more aware of its educational uses. Also, some of the interviewees claimed that they had a negative view of Twitter before this experience. However, their views changed after using Twitter to learn grammar. As Yara said, "I knew that it [Twitter] was a space in which I could learn, it does not only include sharp conflicts and debates. There are some spaces in which I can learn."

Concerns about Using Twitter to Learn Grammar

Despite the benefits associated with using Twitter to learn grammar, some of the interviewees pointed out concerns. One of the interviewees pointed out that using Twitter to learn grammar has a negative effect on the health of her eyes because they get tired when she uses devices. This result is supported by Issa et al. (2021), who concluded that using mobile devices can cause ocular manifestations. Moreover, some of the interviewees mentioned that they sometimes encountered difficulty accessing Twitter when their internet connection was weak or absent. This result is similar to that observed by Taskiran et al. (2018), who found that learners might face difficulties in accessing Twitter because of their internet connections. Additionally, some of the interviewees reported that they were concerned about the lack of privacy when they were using Twitter to learn grammar. They felt that their privacy was threatened as their accounts were available to their classmates. This result matches something observed by Taskiran et al. (2018), who found that a lack of privacy could discourage learners from using Twitter for language-learning purposes.

Another concern associated with using Twitter to learn grammar, as one of the interviewees mentioned, was that she felt sometimes nervous because her answers were available to her classmates. Manar, when asked about her experience generally, stated, “I benefited [from using Twitter to learn grammar], but felt nervous because ... my answers were public, so I had to focus [while answering the questions].” Manar linked the availability of answers to a lack of confidence because she was afraid of posting wrong answers, which could threaten her social image. Similarly, Rosell-Aguilar (2020) confirmed that a lack of confidence is one of the factors that prevent EFL learners from tweeting in English.

Finally, some of the interviewees described Twitter as a somewhat distracting learning tool. A possible explanation for this is that students use Twitter for entertainment, which could distract them from completing the activities. Many of the interviewees mentioned that they accessed Twitter using their mobile devices. A study conducted by Alfallaj (2020) confirmed that Saudi students, when use their smart devices for learning English, miss the educational content because they indulge in non-academic activities.

Conclusion and Implications

This study set out to determine the extent to which Twitter is effective in developing the receptive and productive grammatical knowledge of EFL Saudi female students. It also aimed to explore their perceptions of using Twitter to learn grammar. The study found that Twitter generally appears to not have a significant positive effect on the receptive grammatical knowledge of EFL Saudi female students, but it seems to be helpful in developing their overall productive grammatical knowledge, and its degree of effect can be affected by the grammatical structures under instruction. Moreover, the results showed that the students generally had positive perceptions of using Twitter to learn grammar, although they had some concerns.

The results of this study have some instructional and pedagogical implications for EFL teachers, students, and curriculum designers. First, Twitter seems more suitable for relatively extended production activities (e.g., writing sentences) than receptive or limited production activities (e.g., MCQs and filling-in-the-blanks activities, respectively). Therefore, EFL teachers can implement Twitter in activities that require students to write sentences or participate in asynchronous discussions. Due to mobility, students can complete various activities anytime and anywhere via Twitter, which provides flexibility. Moreover, Twitter can enhance students’ motivation to learn grammar and reduce their apprehension.

Another important lesson learned from the results is that the fact that students have positive perceptions of a particular learning strategy does not necessarily indicate that it is effective. Even though the students in this study expressed positive views about the approach implemented in this study, the results showed that Twitter’s effectiveness in developing receptive grammatical knowledge was very limited. Therefore, testing the effectiveness of learning strategies is necessary and more useful than students’ views. Those involved in EFL instruction should consider the practical gap between students’ views of learning strategies and their actual effectiveness. Students’ perceptions of a particular learning strategy can be a partial indicator of its effectiveness, but testing students’ performance is a stronger indicator of its effectiveness.

Although the current study adds to a growing body of literature on the effectiveness of Twitter-based language learning, it has thrown up many questions in need of further investigation. First, this study included only selected grammatical structures. Future research can investigate the effect of Twitter on other areas of grammar. Second, all the participants in this study were female. Therefore, the effect of gender was not investigated. Future research can examine the possible effect of gender on students’

responses to Twitter-based grammar instruction. Third, while this study showed students' perceptions of applying Twitter to learning grammar, teachers' perceptions of Twitter-based grammar instruction are also worth exploring. Finally, this study examined the effect of Twitter on the grammatical knowledge of EFL students at a tertiary level. Including students at other levels would be significant because students' level might affect the results.

The findings in this study are subject to some limitations that need to be recognized. First, the study was conducted with a small sample because there were relatively few students in each class and only some of them agreed to participate and completed the requirements. With a small sample size, caution must be applied as the findings might not be generalizable to a larger number of students. Future researchers should include a larger pool of subjects to enhance the generalizability of the findings. Another limitation of this study is its short duration, which was due to limited time. The students in both groups completed 22 activities about seven grammatical structures over nearly five weeks. Furthermore, the current study was not specifically designed to evaluate students' proficiency levels and gender or how these factors affect their development and perceptions.

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