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The Effect of Collaborative Writing Using Google Docs on EFL Learners' Writing Performance and Writing Self-regulation

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Abstract

The use of Web 2.0 technology in language education has received much research attention quite recently. In an attempt to shed more light on the use of Google Docs as a kind of Web 2.0 technology in language learning, the purpose of the present study was to compare the effects of online collaborative writing using Google Docs and collaborative writing in a face-to-face classroom on the writing performance and writing self-regulation of EFL learners. A sample of 38 homogeneous intermediate learners was recruited as the participants who were then randomly divided to an experimental group (N = 19) and a control group (N = 19). The participants of the experimental group received online collaborative writing using Google Docs while the control group received collaborative writing in the face-to-face classroom. Two timed-writing tasks and the Second Language Writing Self-regulation (SLWS) scale were administered to gather the data. The results obtained from performing paired-samples t-tests and ANCOVA revealed that collaborative writing both via using Google Docs and in the face-to-face classroom significantly enhanced the writing performance and writing self-regulation of the participants. However, the gains experienced by the experimental group were significantly higher than those experienced by the control group. Pedagogical implications for Google Docs-supported collaborative writing are finally discussed.

Keywords: Google docs, writing performance, writing self-regulation, EFL learners, collaborative writing

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1. Introduction

Writing in a second language still suffers from the lack of a comprehensive and conclusive theory or model (Ferris & Hedgcock, 2014; Hyland, 2019). However, collaborative writing which enjoys significant theoretical and empirical support has gained much momentum among researchers and educators (Fernández-Dobao, 2020; Fung, 2010; Hirvela, 1999; Storch, 2005). Collaborative writing is technically defined as "an activity where there is a shared and negotiated decision-making process and a shared responsibility for the production of a single text" (Storch, 2013, p. 3). In fact, collaborative writing is essentially based on interaction among peers in the process of producing a written text. The significance of interaction among peers and its effectiveness in learning has been widely acknowledged (Kieser & Golden, 2009; Tanis, 2020). It is argued that peer-interaction enhances further learner engagement, problem solving abilities, and also information-seeking competencies (Dao, 2020; Kieser & Golden, 2009; Swain & Lapkin, 1998). Theoretically speaking, peer-interaction is justified in the light of scaffolding and socio-cultural theory of mind (Vygotsky, 1978), which highlights the role of peers in actuating each other's potential level of development.

As far as writing skill is concerned, peer-interaction is claimed to positively affect writing competencies (Buss & Karnowski, 2000; Lundstrom & Baker, 2009). More specifically, when learners are engaged in peer-editing, which is a collaborative learning process, they are able to interact, read, and criticize the writing of their peers (Nagin, 2012; Yu & Lee, 2016). This situation provides the writers with the opportunity to receive further corrective feedback from the others, thereby helping learners to increase the quality of their writing.

Although peer-interaction is recognized to be effective in improving students' learning, effective peer-interaction seems to be rare in traditional face-to-face classrooms, as these classes are usually constrained by time limitations and other administrative obstacles (Ebadi & Rahimi, 2017). Effective interaction among peers requires a comfortable and non-threatening environment and rich social settings (Aghaee & Keller, 2016; Resta & Laferrière, 2007; Soller et al., 1998). However, with the advent of internet technology and online interaction devices, some of these challenges have been removed as learners are provided with adequate time and non-threatening environments so that they can build up more positive and active learning among their peers (Sotillo, 2002; Zorko, 2009). Online interactive applications foster teamwork and alleviate the problem of unequal participation of

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learners (Chen, 2016; Parsazadeh et al., 2018; Thorbjørnsen et al., 2002). As a result, it seems that collaborative writing through Web 2.0 technologies like Moodle, wikis, blogs, and Google Docs might be more promising in the new era (Woo et al., 2013; Yang, 2010).

Since L2 writing is considered to be a cognitively taxing process requiring simultaneous mobilization of several linguistic and affective variables (Kellogg, 1996), the exploration of affective factors pertaining to L2 writing is much emphasized by researchers in this area (Han & Hiver, 2018; Piniel & Csizér, 2015; Zabihi, 2018). Moreover, given the significance of the dynamic nature of L2 learning (Hiver & Al-Hoorie, 2016), much research attention should be directed to the complex interaction between the individual differences of L2 learners and their context-sensitive idiosyncrasies (Larsen-Freeman, 2016). In the light of this theoretical backdrop, research into L2 writing self-regulation seems to be essentially lacking on the research agenda in L2 learning and teaching although self-regulation has been widely investigated as an alluring construct in other aspects of L2 learning (e.g., Lam, 2014; Platt & Brooks, 2009).

Taken together, an accumulated body of research lend credit to the use of the Web 2.0 applications such as forums, blogs, wikis, and Google Docs in L2 writing courses as they allow the educators to create online interactive environments for collaborative writing in which L2 writers can receive feedback from instructors and their peers and get involved in peer feedback and peer editing of writing (Dizon, 2016; Strobl, 2013). However, the investigation of Google Docs in writing courses has remained more under-researched than its other Web 2.0 counterparts (i.e., bogs or wikis) (Ebadi & Rahimi, 2017). Given the fact that Google Docs offers some convenient features for writing courses including peer feedback, peer editing, redrafting, and tracking the changes to texts (Semeraro & Moore, 2016), obtaining further empirical support in favor of the effectiveness of Google Docs might introduce a promising and viable technology application for EFL writing instruction. In addition, although numerous studies have investigated the use of Google Docs in collaborative EFL writing courses, the L2 writing psychological factors (i.e., writing self-regulation) have not received research attention in Google Docs-supported writing courses. Therefore, as an attempt to shed more light on the potential impacts of using Google Docs on the L2 writing development, the present study sought to compare the effects of online collaborative writing using Google

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Docs and collaborative writing in the face-to-face classroom on the writing performance and writing self-regulation of Iranian EFL learners.

2. Review of Literature

Categorized as a learner-centered Web 2.0 technology, Google Docs is a user-friendly tool allowing for effective sharing potentials by which the materials and documents can be shared with anyone or with a particular numbers of users. It can be conveniently installed for group collaboration, with every group possessing its own online space. The educator can see and monitor the users on pages linked to the teacher's account and is able to provide the whole class with the ability to access the previously completed projects at any time. Documents in Google Docs can be viewed, revised, and edited simultaneously by everyone having access to it. Google Docs can also retain the total revision history, allowing the users to review previous versions, and to observe what the other users have written or edited (Godwin-Jones, 2018). Enabling learners to write and peer-edit a text, Google Docs is considered as an effective online interactive application that can enhance writing competencies (e.g., Abrams, 2016; Ebadi & Rahimi, 2017; Fathi & Rahimi, 2020; Rahimi & Fathi, 2021). Google Docs also positively affects group collaboration and saves the time of the learners as it provides them with asynchronous peer-editing capacity (Slavkov, 2015; Yang, 2010).

Concerning L2 writing learning and teaching, a significant body of empirical studies has been carried out to investigate the positive role of Web 2.0 technologies, such as blogs and wikis, in enhancing writing competencies (e.g., Bikowski & Vithanage, 2016; Fathi & Nourzadeh, 2019; Strobl, 2013). However, a limited number of studies have ever explored the effect of employing Google Docs on writing skills of EFL learners (Chu & Kennedy, 2011; Ebadi & Rahimi, 2017). It is beyond the scope and objective of the present study to review all the existing body of research carried out in this area; however, to ground this study, some more illustrative and relevant studies are briefly reviewed here. For example, Marandi and Seyyedrezaie (2017) compared the impacts of the use of Google Drive in a writing course with those of face-to-face writing instruction on the writing performance as well as writing anxiety of EFL learners. Using a quasi-experimental design, the researchers carried out a seven-week intervention during which the participants were taught how to write formal essays in English. The results of their

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data analysis indicated that both kinds of writing instruction interventions were substantially effective in improving the writing performance of the participants. However, they found the Google Drive supported writing instruction more effective than face-to-face writing instruction. Moreover, it was revealed that the participants who received Google Drive-supported writing instruction showed less writing anxiety than those who received face-to-face writing instruction.

Using a sequentially explanatory research design, Ebadi and Rahimi (2017) also investigated the effect of online peer-editing using Google Docs on the academic writing abilities of a sample of EFL learners. In the quantitative phase, they employed a quasi-experimental design that involved two intact classes. One group received face-to-face writing instruction, whereas the other group used Google Docs for online peer-editing. IELTS academic writing tasks and semi-structured interviews were used to gather the data. The findings of this study indicated that online peer-editing using Google Docs significantly contributed to improving the writing performance of the participants. Moreover, the content analysis of the qualitative data demonstrated the positive perceptions of the learners towards the effect of online peer-editing using Google Docs. Carrying out a study to examine the effectiveness of employing Google Docs for L2 learners, Zhou et al. (2012) also indicated that Google Docs was effective in developing the learners' collaborative writing and learning competencies. The participants used Google Docs to carry out writing tasks in groups of three or four as assignments outside the classroom. The students held positive attitudes towards the course and found Google Docs as an effective tool for doing writing assignments.

In another study, Suwantarathip and Wichadee (2014) investigated the differential effects of collaborative writing instruction using Google Docs and collaborative writing in a face-to-face classroom on students' writing abilities. As for their treatment, the two groups were required to carry out four writing assignments. The experimental group completed the tasks outside the class collaboratively with Google Docs, whereas the control group carried out the tasks together inside the class. The findings revealed that the participants in the Google Docs group outperformed those in the face-to-face classroom. Moreover, it was revealed that the participants held positive perceptions towards collaborative writing using Google Docs. Also, Seyyedrezaie et al. (2016) verified the effectiveness of Google in enhancing writing performance of the EFL learners. In addition, the

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qualitative data analysis of their data indicated that the participants perceived internal as well as external causes for their success and failure, though the role of internal factors was more obvious in case of failure. The researchers also found that the participants held positive attitude towards the use of Google Docs in writing instruction.

In another study, Bikowski and Vithanage (2016) found that although both individual and collaborative web-based writing were effective in developing L2 learners' writing skills, the positive effect of collaborative web-based writing turned out to be more substantial. Also, the results of the survey revealed that L2 writers held positive perceptions towards the in-class web-based writing instruction but they preferred group writing activities to the individual ones. The participants also welcomed was teacher corrections more than peers' corrections as they doubted the editing skills of their peers. Using a qualitative case study, Alharbi (2019) examined the effectiveness of Google Docs in an EFL writing course. The analyses of the teacher's observation as well as feedback, students' comments and editing via Google Docs along with their follow-up interviews revealed that Google Docs was effective in improving writing skills by providing learners with the opportunity to receive feedback from teacher and peers, peer-edit and revise drafts of writing, and give responses to the peers. In another study, Abrams (2016) explored the computer-mediated collaborative writing supported by Google Docs among a number of L2 learners of German. This study expanded the previous models of collaborative writing according to the participatory patterns along the two axes of *equality* which is concerned with equally distributed participation of learners as well as the equal monitoring over the activity, and *mutuality* conceptualized as the degree of involvement in a peer's participation. Moreover, it was found that the writers were willing to give precedence to meaning rather than to form while doing computer-supported collaborative tasks.

Considered as an individual and affective factor affecting L2 writing, writing self-regulation is conceptualized as the degree to which L2 learners perceive, appreciate, and manage their writing tasks effectively (Kormos, 2012). Given the cognitive complexity of L2 writing, learners should build up their self-awareness, monitoring and planning, as well as the employment of control strategies in overcoming the burden of this cognitively taxing activity (Csizér & Tankó, 2017). It is argued that L2 writers with higher levels of self-regulation perceive, understand, and manage their writing tasks in the manners which are basically different from

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their less self-regulated peers (Kormos, 2012). These writers are claimed to be more competent in organizing, exerting, and maintaining their efforts in doing L2 writing tasks (Teng & Zhang, 2016). Therefore, more self-regulated L2 writers are likely to be more successful in developing ideas, outlining, monitoring and planning, drafting, revising, and editing their written tasks (Han & Hiver, 2018).

Concerning the effect of writing instruction on L2 learners' self-regulation, a number of empirical studies have been previously conducted. For example, Han and Hiver (2018) explored the effect of genre-based L2 writing instruction on writing-related psychological factors. Employing a longitudinal cluster analysis, the researchers traced the change in L2 learners' writing-specific affective variables including writing self-regulation, self-efficacy, and anxiety. Their results indicated that genre-based L2 writing instruction significantly contributed to enhancing students' writing self-regulation and their writing self-efficacy. In another study, Fathi et al. (2019) found that a blog-mediated writing course enhanced writing self-regulation of EFL learners. As a justification, the authors maintained that blog-mediated instruction helped the participants experience a sense of further engagement, agency, and responsibility in doing writing tasks, thereby enhancing their writing self-regulation. Furthermore, Lam (2015) maintained that providing feedback to learners through portfolio assessment of writing could improve self-regulation of L2 writers.

In spite of the studies reviewed above, research into the effects of the use of Google Docs in writing instruction on EFL learners' writing performance and writing-related psychological factors (i.e., writing self-regulation) is essentially lacking. Therefore, wholesale employment of Google Docs for EFL collaborative writing requires further empirical support and warrants further studies to be carried out.

3. Method

The present study was a part of a larger research project in which the effect of online collaborative writing using Google Docs on several dependent variables was empirically examined. Nevertheless, the current article only reports the procedure and results associated with writing performance and writing self-regulation as the two dependent variables under investigation. This study employed a quantitative, experimental research design. As the participants were selected from intermediate

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students of a single language institute and it was not possible to randomly select them from a bigger population, quasi-experimental design was employed. This design is often used when it is not logistically feasible to conduct a randomized, controlled trial study (Ary et al., 2019).

3.1. Participants

Initially, a total number of 57 participants were selected from the population of intermediate EFL learners from a private language institute in Tehran, Iran. Since general language proficiency could be a variable affecting writing performance, the participants' homogeneity in terms of global English proficiency was taken into account. In so doing, a version of Preliminary English Test (PET) was administered. Based on the scores of PET, a number of 38 learners whose scores fell between +1SD and -1SD from the mean were recruited as the ultimate homogeneous sample of the participants. Then, these participants were randomly divided to an experimental group (N= 19) and a control group (N= 19). These students had enrolled in a supplementary English writing course whose purpose was to enhance basic writing skills of intermediate EFL students. During the study intervention, the experimental group received online collaborative writing using Google Docs while the control group received collaborative writing in the face-to-face classroom. All the participants were female, therefore, gender could not act as a moderator or confounding variable. The age of the participants ranged from 20 to 24, with the mean age of 21.68. They were university students of different disciplines and were passing the pre-requisite English courses to take IELTS. The first language of all of the participants was Persian and they had already received the preliminary instruction of sentence and paragraph writing as reported by their instructors. Not any of the participants had previous experience of using Google Docs for learning purposes in general and collaborative writing in particular.

3.2. Instruments

3.2.1. English Proficiency Test

To select a homogeneous number of students as the participants of the study, a sample of PET published by Cambridge English for Speakers of Other Languages (ESOL, 2009) was given to the EFL learners. This sample of PET included three

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parts: Reading (5 parts, 35 points), Listening (4 Parts, 25 points), Speaking (4 parts, 15 points). The reliability coefficient of the reading and listening sections was reported to be 0.84, as estimated by Cronbach's Alpha formula. Also, the inter-rater reliability coefficient for the speaking section turned out to be 0.79, which is considered as an acceptable reliability coefficient.

3.2.2. Timed-writing Tasks

In order to measure the writing performance of the EFL participants, two 45-minute timed-writing tasks were given to the participants before and after the treatment as the pre-test and post-test, respectively. To this end, the participants of both groups were asked to write about two general topics which did not require any specific background knowledge.

Topic A: Which transportation vehicle has changed people's lives?

Topic B: What characteristic makes people successful?

3.2.3. Second Language Writing Self-regulation (SLWS)

To assess participants' level of writing self-regulation, L2 writing self-regulation scale (SLWS) designed by Han and Hiver (2018) was administered to the students of both groups before (i.e., pre-test) and after the experiment (i.e., post-test). SLWS comprises the items **(**see Appendix**)** which were created to measure the strategic effort of L2 learners in organizing and achieving their writing-related objectives and learning processes. This questionnaire is a 6-point Likert scale varying from 1 (strongly disagree) to 6 (strongly agree). The reliability coefficient of this scale, as measured by Cronbach's Alpha formula, was reported be 0.83 in the current study.

3.2.4. The Writing Scoring Scale

Jacobs et al.'s (1981) writing scale was employed to score the written tasks of the participants in both pre-test and post-test. This rating rubric is a kind of analytical scoring technique which takes into consideration a set of criteria for scoring an essay (Weigle, 2002). These criteria consist of five dimensions of content, organization, vocabulary use, language use and mechanics. The multi-faceted nature of this scoring

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rubric makes it an effective scoring system as it investigates different features of a written text (Brown & Bailey, 1984). All the written tasks and essays were rated by the first researcher who was familiar and trained with this scoring rubric. To ensure the inter-rater reliability of rating procedure, one third of the timed-writing tasks were scored by an independent trained rater. The reliability index as measured by Cohen's Kappa's inter-rater reliability test turned out to be 0.81.

3.2.5. Materials for the writing course

As for the materials of the writing course, the main materials were the content of the textbook entitled "Academic Writing: From Paragraph to Essay" by Zemach and Rumisek (2003). This coursebook was employed by the instructor for both the experimental and the control groups. This book has been developed for the L2 students with intermediate language ability and it employs a process approach to writing along with the explicit instruction of different types of paragraphs and other components of writing such as thesis statements and outlines of an essay. The book also includes group activities requiring feedback, peer-editing, and writing multiple drafts.

3.3. Data Collection Procedure

The procedure of this study was carried out in a private language institute in the summer of 2019. Before the beginning of the writing course, a sample of PET was administered to ensure the homogeneity of participants. According to the scores of PET, 38 students whose scores fell between +1SD and -1SD from the mean were recruited as the final sample of the participants. The participants were then randomly divided to an experimental group (online collaborative writing using Google Docs) and a control group (collaborative writing in the face-to-face classroom). In the first session, the timed-writing task (Topic A) and SLWS were administered to the participants as the pre-test in order to determine their initial level of L2 writing performance and writing self-regulation.

During the writing course which lasted for fourteen weeks, the control group were received just inside-class instruction, while the experimental group used Google Docs in addition to their regular in-class writing instruction. The writing course for both groups was according to the procedures of process approach. Both

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groups were instructed by the same educator who employed the same materials and the same curriculum.

The purpose of this writing course was to make the students become familiar with various kinds of paragraphs (descriptive & process, opinion, comparison/contrast, & solution). In fact, the teacher introduced the students with each paragraph and the learners were required to write a sample of that type of paragraph as the homework. Students' written tasks were produced after writing several drafts; students first produced the first draft, received feedback, redrafted, and finally wrote the final draft. Moreover, the students of both groups were taught on how to do peer-editing or collaborative writing. To this end, the instructor provided them with a sample video in which a trained rater went through a whole process of peer-editing on a sample written document. In addition, the instructor provided the participants with detailed explanations of the components of writing including content, organization, language use, vocabulary, and mechanics.

As for the purpose of this study, the students in the experimental group constructed their own Google Docs which could be accessed by the other students and the instructor. The learners were divided into groups of four or five students in order to share comments and peer-edit each other's written tasks. The students were required to give comments and edit their peers' writing tasks in groups employing Google Docs outside the classroom. They were also asked to edit their peers' written tasks by monitoring the key characteristics of content, organization, language use, vocabulary, and mechanics on a regular basis. More particularly, the participants were required to write the first draft, shared the first draft with their peers on Google Docs in which they peer edited or received peer feedback. Afterwards, they revised their writing and produced the third draft on which the peers and the teacher gave further comments and revisions until the final draft was written

In the meantime, the participants of the control group underwent the identical writing procedure and were required to carry out the same assignments in a collaborative way. The students of the control group were also divided into groups of four and five and were required to peer-edit and give comments to the written tasks of their peers. Therefore, these learners were also engaged in peer-editing each session. At the end of the EFL writing course, the participants of both groups were asked to complete the same SLWS which was re-administered as the post-test of the study. Moreover, the other timed-writing task (Topic B) was administered to the

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participants to measure their writing performance as the post-test of the study.

4. Results

As discussed above, a version of PET was administered to the EFL students to ensure the homogeneity of the learners selected as the participants of this research. Based on the results of PET, thirty-eight EFL learners whose scores lay between +1SD and -1SD from the mean were selected as the final homogenized sample of the participants. The homogenized participants were then randomly divided into an experimental group and a control group. An independent-samples t-test was performed to compare the PET mean scores of the two groups. The results (see Table 1) demonstrated that there was no statistically significant difference between the mean scores of the experimental group (M = 64.02, SD = 14.98) and the control group (M = 65.89, SD = 15.66); t (36) = -.592, p > 0.00), suggesting that the two groups were not different in terms of general English proficiency before beginning the treatment.

Table 1
Results of the PET for Each Group

Groups	M (SD)	*T*	Sig.
Experimental Group	64.02 (14.98)	-.592	.435
Control Group	65.89 (15.66)		

Then, to investigate the effect of online collaborative writing using Google Docs on the writing performance, paired-samples *t*-tests were performed to trace the change in the mean scores of the experimental group (i.e., Google Docs supported collaborative writing) and the control group (i.e., collaborative writing in the face-to-face classroom) from the pretest to posttest. As Table 2 shows, a statistically significant increase was observed from the pretest to posttest of writing performance for both the experimental group (t(18) = -13.12 p < 0.00) and the control group (t(18) = -9.45, p < 0.00). As presented in Table 2, the mean score for writing performance of the experimental group increased from 11.56 (SD = 3.85) on the pretest to 16.92 (SD = 4.01) on the posttest. In the same vein, the mean score of writing performance for the control group increased from 10.94 (SD = 3.91) on the pretest to 14.26 (SD = 3.97) on the posttest, indicating that both types of collaborative writing instructions significantly improved the writing performance of the participants.

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Table 2
Paired Samples T-test for Writing Performance Scores

	Pre-test		Post-test			
Groups	*M*	*SD*	*M*	*SD*	*T*	Sig.
Experimental	11.56	3.85	16.92	4.01	-13.12	0.00
Control	10.94	3.91	14.26	3.97	-9.45	0.00

In addition, a One-Way Analysis of Covariance (ANCOVA) was performed on the scores of writing performance to examine the effects of the two types of treatments on the EFL writing performance. In this analysis, the independent variable was the type of treatment (i.e., Google Docs supported collaborative writing or collaborative writing in the face-to-face classroom), and the dependent variable was the scores of the participants on the post-test of writing performance. The pre-test scores on the timed-writing tasks were viewed as the covariate in the ANCOVA analysis. The investigation of the assumption revealed that the assumptions of homogeneity of variance, normality, linearity and homogeneity of regression slopes were not violated.

The results of the ANCOVA analysis (see Table 3) using the General Linear Modeling technique in SPSS showed that a statistically significant difference was observed between the experimental group and the control group in the mean scores on the posttest of writing performance; $F(1, 35) = 21.681$, $p = 0.000$, partial eta squared = 0.383), highlighting that online collaborative writing using Google Docs was more effective than collaborative writing in the face-to-face classroom with regard to enhancing the writing performance of the EFL participants.

Table 3
ANCOVA Results for Writing Performance Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Covariate (pre-test)	205.566	1	205.566	101.845	.000	.744
Between-subjects	43.762	1	43.762	21.681	.000	.383
Within-subjects	70.645	35	2.018			

In the follow-up analysis, in order to examine the effects of the two types of writing instruction (i.e. Google Docs supported collaborative writing or

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collaborative writing in the face-to-face classroom) on the writing self-regulation of the EFL participants, paired-samples *t*-test were carried out to investigate the changes in the mean scores of the two groups from the pre-test to posttest. As demonstrated in Table 4, there was a statistically significant increase from the pre-test to posttest of writing self-regulation for the experimental group ($t(18) = -9.47$, $p < 0.00$) and the control group ($t(18) = -6.29$, $p < 0.00$). Table 4 shows that the mean score of writing self-regulation for the experimental group increased from 15.50 (SD=4.50) on the pre-test to 22.52 (SD=5.10) on the post-test. Likewise, the writing self-regulation mean score of the control group increased from 16.36 (SD=4.80) on the pre-test to 19.23 (SD=5.68) on the post-test, suggesting that both types of collaborative writing instructions significantly enhanced the writing self-regulation of the EFL learners.

Table 4
Paired Samples T-test for Writing Self-regulation Scores

	Pre-test		Post-test			
Groups	*M*	*SD*	*M*	*SD*	*T*	Sig.
Experimental	15.50	4.50	22.52	5.10	-9.47	0.00
Control	16.36	4.80	19.23	5.68	-6.29	0.00

As the inferential statistics, moreover, ANCOVA was performed on the writing self-regulation scores to compare the effects of the two kinds of writing instruction employed in the present research on the writing self-regulation of the participants. Again, the dependent variable was participants' scores on the post-test of the writing self-regulation scale. The pre-test scores of writing self-regulation were also considered as the covariate in the ANCOVA analysis. The results of the ANCOVA analysis (see Table 5) indicated that a statistically significant difference was observed between the experimental group and control group in the mean scores on the post-test of writing self-regulation; $F(1, 35) = 21.529$, $p = 0.000$, partial eta squared = 0.381), suggesting that Google Docs supported collaborative writing was more effective than collaborative writing in the face-to-face classroom in improving the writing self-regulation of the EFL students.

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Table 5
ANCOVA Results for Writing Self-regulation Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Covariate (pre-test)	439.729	1	439.729	59.609	.000	.630
Between-subjects	158.818	1	158.818	21.529	.000	.381
Within-subjects	258.192	35	7.377			

5. Discussion

The purpose of the present study was set to compare the impacts of online collaborative writing supported Google Docs and collaborative writing occurring in the face-to-face classroom on the writing performance and writing self-regulation of Iranian EFL learners. The results revealed that both types of collaborative writing instructions significantly contributed to improving the writing performance and writing self-regulation of the participants. However, online collaborative writing using Google Docs turned out to be more effective than collaborative writing in the face-to-face classroom in improving both writing performance and self-regulation. The findings of the current study verify those of Ebadi and Rahimi (2017) who found that peer-editing through Google Docs contributed to improving EFL learners' academic writing abilities both in the short and long term. They also revealed that the EFL participants held positive attitudes towards using Google Docs for online peer-editing. As referred to in Ebadi and Rahimi's study, the results in the current study may be attributed to more collaborative and convenient characteristics of Google Docs for peer-editing. Similarly, Suwantarathip and Wichadee (2014) indicated that collaboration and peer-editing characteristics of Google Docs helped students significantly improve their global writing skills. In addition, the better performance of the experimental group might be related to the positive attitudes of the participants towards their experienced Google Docs-supported collaborative writing, as was revealed in the qualitative data of Ebadi and Rahimi (2017).

It can be argued that Google Docs, a user-friendly application, provided the participants with the ability to edit the writing of their peers easily and without time and space restrictions. Therefore, the participants were able to think about their writing assignments more deeply at their own pace and in their convenient time. But

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the collaborative writing in the face-to-face classroom might have been negatively affected by the potentially anxiety-provoking learning atmosphere due to the presence of teacher and their peers as well as time constraints for doing the written tasks (Riley-Huff, 2010). This finding corroborates those of Marandi and Seyyedrezaie (2017) who found that Google Drive-integrated writing instruction contributed to reducing writing anxiety of the EFL learners as the anxious students were provided with the opportunity to improve their drafts by receiving feedbacks from peers and teacher. Also, it can be stated that participants were able to not only share their written tasks with their peers by the use of Google Docs but they also could easily change, revise, and omit the texts. Therefore, they could have learned from the editing of their peers as well as the multiple comments and feedback of the others, thereby transferring what they had learned from their peers to their own written tasks.

In addition, since the participants knew that their writing would be viewed and receive feedback by their peers, they devoted more effort and attention to writing better quality drafts. This is in line with the findings of Blau and Caspi (2009) who corroborated the significance of peer-editing and giving feedback in improving the writing competencies of the learners. As discussed above, peer feedback which serves as a kind of peer scaffolding can help writers to carry out writing tasks more successfully (Villamil & de Guerrero, 2006). Based on the related theoretical backgrounds (Aljaafreh & Lantolf, 1994), the effective feedback should be interactively occurring between teacher and learner or between learner and learner. The findings of this study revealed that online collaborative writing using Google Docs provided effective feedback by overcoming the problems of time and space constraints, usually associated with face-to-face classrooms. In this regard, Koch (2010) claimed that today's students are likely to be more willing to use Google Docs as an out-of-class and online collaborative platform rather than to meet their classmates in a face-to-face classroom. This finding of the study is also partially consistent with those of Bikowski and Vithanage (2016) who verified the effectiveness of the web-based collaborative writing in improving students' writing performance and their confidence in doing writing tasks.

The findings of the study also indicated that online collaborative writing using Google Docs was effective in enhancing the writing self-regulation of the participants. This finding is partially in line with that of Boykin et al. (2019), who found that computer-mediated instruction accompanied by embedded self-regulation strategies could substantially improve students' writing performance. It

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may be argued that online collaborative writing with the use of Google Docs might have enhanced EFL learners' self-regulation strategies, such as goal setting, brainstorming, planning and monitoring, as well as their self-evaluation and meta-cognitive abilities in doing writing tasks. In addition, the participants who received Google Docs-supported writing instruction felt more responsibility and took charge of their own writing, a process in which the writers began to regulate their own learning more effectively. Similarly, Alharbi (2019) found that the use of Google Docs provided the L2 learners with the opportunity to improve their writing and become more engaged in tasks because of receiving and giving feedback to written drafts. Likewise, Blau and Caspi (2009) indicated that feedback provision and collaborative writing could improve learners' writing as they experienced further responsibility and agency for their own and their peer's writings. This finding is also in line with the findings of Fathi et al. (2019), who verified the effectiveness of the use of blogs as a Web 2.0 technology in fostering writing self-regulation of the participants. Following Fathi et al. (2019), the use of Google Docs is likely to have increased learners' sense of agency of the participants as they were actively involved in peer editing, setting goals as well as planning and monitoring their own writing, receiving and giving feedback, thereby increasing their self-awareness and employment of control strategies in doing writing tasks. In addition, peer editing and peer feedback through the use of Google Docs provided a kind of collective scaffolding (Donato, 1994), which contributed to developing effective strategies among the participants to self-regulate their learning when they were doing their writing tasks (Csizér & Tankó, 2017). Furthermore, since the participants observed peer editing and received peer feedback, they became more conscious of the criteria for an acceptable piece of writing. As a result of this further awareness, the EFL students exerted much effort in planning and monitoring their writing tasks.

6. Conclusion

The present study sought to explore the effects of online collaborative writing through the use of Google Docs on the writing performance and writing self-regulation of Iranian EFL learners. The results of the comparison of the control group and the experimental group indicated that collaborative writing both though employing Google Docs and in the face-to-face classroom helped participants to improve their writing performance and their writing self-regulation. Nevertheless,

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the progress of the experimental group in both variables was significantly higher than that of the control group. Overall, the findings of this study revealed that online collaborative writing using Google Docs significantly contributed to improving the writing performance and writing self-regulation of the Iranian EFL learners. In fact, it was found that online collaborative writing in which the learners shared and peer-edited their written tasks helped the EFL learners to enhance both their writing performance and their writing self-regulation. Google Docs allows learners to share their assignment, review, peer-edit, give and receive feedback, as well as revise and redraft their writing tasks. Google Docs is both convenient and less costly as L2 writers are able to both post their drafts to their peers and the teacher for receiving comments and feedback and to devote efforts to improving their writing skills inside and outside the classroom.

With regard to the implications of this study, it may be implied that Google Docs can be integrated into EFL writing courses in order to increase effectiveness of writing development by providing the learners with online peer-editing capacity. However, successful integration of any kind of technology into the regular curriculum needs that both teachers and learners to be equipped with some necessary technological skills which are of great significance for the effective employment of technology for educational purposes (Baylor & Ritchie, 2002; Fathi & Ebadi, 2020). L2 writing instructors should acknowledge and appreciate the usefulness of Google Docs as an effective device which can foster interactive and collaborative learning in L2 writing process. Therefore, it might be necessary that teacher development programs take initiatives to equip the pre-service EFL teachers with technological skills as well as encourage them to integrate technology devices into their L2 instruction in general and into EFL writing courses in particular. In the meantime, it is required that EFL students be trained on how to construct online Google Docs, share their written tasks with their peers in order to revise and discuss the issues, thereby improving their writing skills. Nevertheless, some L2 learners may not welcome peer-editing as they may consider it improper to correct the writing of their peers (Coyle, 2007) or they may doubt the effectiveness of online peer-editing through Google Docs. As a result, L2 writing practitioners should provide the EFL learners with justifiable reasons and clarification on the effectiveness of online peer-editing, especially using Google Docs, in enhancing their writing skills and involving them in the writing process. Given the fact that Iranian EFL writing practitioners basically pursue traditional pedagogical techniques in their classes (Naghdipour, 2016), the use of Web 2.0 technology in

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general and Google Docs in particular might be an effective alternative not only to improve learners' cognitive writing abilities but also to enhance their affective factors in L2 writing such as self-regulation.

Finally, it is worth noting that the present study has some limitations. As the participants of the experimental group lacked any prior experience of using Google Docs for writing development, their increase in writing performance and self-regulation might have been affected by a kind of Hawthorne effect experienced during the treatment. Also, since the participants of this study were limited in number and were of the same level of general English proficiency, the future researchers are recommended to carry out similar studies with larger sample sizes from various contexts and with various proficiency levels. In addition, this study employed only a quantitative research design. Given the significance of qualitative research in L2 studies (Dörnyei, 2014), Further studies should employ qualitative or mixed-methods research methods in order to gain deeper insights into how Google Docs and dynamics of peer-editing and collective scaffolding have mediated the learners' development of L2 writing abilities.

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Appendix: Second language writing self-regulation scale

Items		Never	Rarely	Sometimes	Often	Always
1	I know how to reduce my stress from learning writing in English.					
2	I have special techniques to achieve my learning goals when learning writing in English.					
3	I feel satisfied with my own special methods for reducing the stress of writing in English.					
4	I have special techniques to keep my concentration focused when learning writing in English.					
5	I persist until I reach the goals that I make for myself when learning writing in English.					
6	I believe I can achieve my goals more quickly than expected when learning writing in English.					
7	I can cope with the stress from learning writing in English immediately.					
8	When it comes to learning writing in English, I think my methods of controlling procrastination are effective.					

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