Wiki-based collaborative writing in EFL classrooms: Fluency and learners’ attitudes in focus
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Abstract: The purpose of this triangulated mixed-method study was twofold. Firstly, to examine whether the use of wikis as a collaborative tool affected EFL learners’ writing fluency. Secondly, to explore their attitudes toward using wikis. To this end, 72 EFL learners from a language institute in Gachsaran, Iran were selected through convenience sampling and randomly assigned into two groups of conventional and wiki-based writing classes. Whereas the traditional group submitted their writing assignments to the teacher for feedback in class, the wiki group uploaded their writing assignments in the teacher-created wiki site where the learners themselves edited and corrected their writings and sometimes discussed writing topics further. To explore the participants’ attitudes on the use of wiki-based writing, we administered a post-task attitude questionnaire entailing 18 five-point Likert scale items and four open-ended questions. Observational notes were also taken into account for data triangulation. The statistical results indicated that the participants in the wiki group significantly outperformed the traditional group in terms of writing fluency. The results of the qualitative phase of the study involving thematic analysis of the answers to the four open-ended questions as well as the field notes supported the quantitative findings in that the learners generally held positive

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PUBLIC INTEREST STATEMENT
Given the salient role of writing in meeting academic purposes, there is a growing interest in new approaches to teaching writing that incorporate web-based tools. Wiki-based collaborative writing has recently gained ground in second language classes due to the potential of wikis to enhance language learners’ collaboration and interaction. Employing a triangulated research study, we investigated the impact of wiki writing on language learners’ writing fluency in the context of Iran. Our results lend support to the findings of other studies demonstrating that wiki-based writing contributes to writing fluency. Further, the results manifested that this writing tool can raise language learners’ motivation, self-regulation, and collaboration. Wiki-based collaborative writing can be effectively implemented in language classes. Educational policymakers can encourage language teachers and even teachers of other subjects to integrate wikis into their instructional programs. Learning tasks and technological tools can create a culture of collaboration and support in an online context.
attitudes toward using wikis. The implications of the results are also discussed in the paper.

Subjects: Language & Linguistics; Language Teaching & Learning; Literature

Keywords: wiki-based collaborative writing; writing fluency; learners’ attitudes; EFL learners

1. Introduction

In recent years, the use of technology has gained ground in the context of language teaching and that wiki-based collaborative writing is coming to the fore. Computer-mediated tools have afforded a myriad of new opportunities for the application of collaborative writing. This writing platform can lift the limit of mainstream classroom time and space (Ortega, 2009) and build flexibility for language learners to undertake writing tasks in the time and space of their convenience (Loo, 2019).

Alshumaimeri (2011) defined wikis as collaborative tools that help pre-determined members of groups edit each other’s work. Aydin and Yildiz (2014) supported the idea that wikis can be used beyond the environment of classes to help language learners improve themselves through peers’ scaffolding and feedback. Analyzing and clarifying wikis from a second language learning perspective, Rott and Weber (2013) highlighted that a wiki is characterized as a writing platform where language learners collaboratively create a hyperlinked text. Such a text integrates textual, pictorial, and audiovisual information from multiple input sources. Leuf and Cunningham (2001) pointed out that flexible and open editing has deep and great effects on the wiki’s usage, and it allows users to create and edit any page in a web site. Kuteeva (2011) believed that using wikis makes students pay more attention to grammatical correctness and coherence of structures. Woo et al. (2013) emphasized that wikis can help young learners overcome writing problems. They also highlighted the need for the development of social competence through wikis. Kessler (2009) asserted that students can pay attention to form and improve their language accuracy while participating in the wiki-collaborative writing course. He held that learners can achieve better gains if they receive slight supervision from the teacher and not mere learners’ cooperation. He was also of the opinion that teachers’ minimal cooperation does not damage students’ autonomy.

As a ZPD- styled approach to teaching writing, wikis are effective tools for enhancing collaborative writing. Despite the importance attached to socio-cultural theories in promoting language skills in general and writing in particular, very few researchers in Iran have thus far conducted studies related to the use of wikis in the language learning context. Further, these studies have been conducted on college students as participants and language learners at lower English proficiency levels especially learners of the low age range (12-16 years old) have been largely underresearched. Along the same lines, the studies performed concerning wiki-based collaborative writing across the globe have rarely adopted a triangulated mixed methods approach. Motivated by these gaps in the literature, we intended to examine the impact of wiki-based collaborative writing on Iranian language learners’ writing fluency. More specifically, the following research questions guided our study:

1. Does wiki-based collaborative writing improve EFL learners’ writing fluency?

2. What are the attitudes of Iranian EFL learners toward wiki-based collaborative writing? (based on a questionnaire survey, four-open ended questions and main researcher’s observation field notes)

The results of this study might contribute to language learners and EFL teachers in teaching collaborative writing. Moreover, exploring language learners’ perspectives on wikis can inform both learners and educational decision-makers to integrate wiki-mediated collaborative writing into
English language courses. The study may also be significant in that it seeks to lend support to the practicality of using wiki-based writing in the context of language teaching in Iran. It is hoped that the findings of the current study can provide a foundation for sound judgments concerning the effectiveness of wikis for second language writing development.

2. Literature review

2.1. Theoretical background

2.1.1. Wikis
A wiki has been defined as a “freely expandable collection of interlinked web pages, a hypertext system for storing and modifying information, a database, where each page is easily edited by any user with a forms-capable web browser client” (Leuf & Cunningham, 2001, p. 14). Mak and Conian (2008) defined wiki as a software that permits users to freely create and edit the content of web pages.

Larruson and Alterman (2009) believed that standard wikis possess some features. First, they are plastic, meaning that students can do different activities on them. The second feature is that wikis are asynchronous which indicates that learners co-edit wiki pages that are accessible to others at different times and places. Another feature is malleability that makes students do more adaptation to the environment to make it suitable for different classes or for specific traits of some students. The other feature of wikis is that they are non-hierarchical and there is not a centralized authority that controls the changes of the content of the wiki.

Chunhui and Liqin (2015) also enumerated the characteristics of wikis (i.e. simplicity, self-organization, self-growth, and openness). By simplicity is meant learners can overcome psychological barriers to be able to use the tools and have energy and confidence for mastery of curriculum knowledge. Openness implies that members can observe, edit, and modify the pages. Self-organization and self-growth signify that users can control the pace of their learning and organize their own learning process.

Zorko (2007) pointed to some reasons behind the choice of wikis. First, wikis promote peer-to-peer, teacher-teacher, and student-teacher collaboration. Further, they raise students’ motivation because they are aware that a larger audience observes the results of their work. Moreover, wikis facilitate the sharing of knowledge among teachers and students. The members can observe how other members tackle problems and receive ideas from each other. Likewise, wikis empower students to construct their own knowledge without dependence on teachers and learn to be responsible for their own knowledge.

2.1.2. Collaborative writing
Collaborative writing is defined as the joint construction or co-authorship of a text by multiple writers (Storch, 2011) and has attracted the attention of L2 researchers in online contexts (Li, 2013). As an instructional tool, collaborative writing enhances interaction and negotiation of language use opportunities among learners elaborating on language and collaboratively attending to linguistic-related issues (Li & Kim, 2016). Drawing on social constructivism, collaborative writing allows different writers to co-author and collectively create a written text to promote scaffolded performance during the writing process (Li, 2013). Effective interaction and joint decision making are integral to collaborative writing (Storch, 2013).

2.1.3. Comparison of wikis with other asynchronous communication tools
West and West (2009) clarified the difference between wikis and other asynchronous communication tools. The similarity of wikis with other types of online communication tools is in their being asynchronous. That is, contributions are made at different times, not in real-time. The difference of wikis with blogs is that the latter is posted only by one user and others are not invited for
comments, but wikis are designed for different users making collaboration within the group. Although threaded discussions are posted by multiple authors, they are different from wikis in that threaded discussion postings are static and users can elaborate on existing messages. The differences are depicted in Table 1.

2.1.3.1. Practical studies on using wikis. Vurdien (2020) investigated how 21 advanced EFL learners in a private language institute in Spain used their smartphones and wikis outside their classroom context. Employing the Google application on their smartphones, the EFL learners undertook their writing assignments on this wiki learning platform, with subsequent peer editing and comments. The results revealed that the EFL learners were strongly in favor of wiki writing and that collaborative writing on the wiki enhanced the transaction of meaning and sharing knowledge.

Chu et al. (2019) conducted research on 33 groups from five classes in a secondary school in Hong Kong. They investigated how learners engaged in wiki-based collaborative writing when they were using their first language or second language. The results of their study demonstrated similarities in wiki writing activity patterns and participation and collaboration levels. Moreover, there existed differences in terms of interaction patterns, with more feedback on planning for the first language groups and more comments and feedback on seeking input for the second language groups.

Gharehbagh et al. (2019) examined the effects of written corrective feedback using wikis among ESL learners. Participants of their study were 14 non-Malaysian students all at a high pre-intermediate to intermediate level of English proficiency from a language school in Kuala Lumpur. The participants were required to provide feedback on their peers’ essays on the wiki platform using a correction checklist presented to them. The findings indicated a significant improvement in terms of language components including content, organization, language use, and vocabulary. The results also revealed that wiki-based writing motivated language learners to learn English.

Kioumarsi et al. (2018) performed a study on 16 graduate students within the age range of 22–32 in a university in Bandar Anzali, Iran. They compared collaborative writing by using wikis with collaborative writing without using wikis. The results of their study revealed that the use of the wiki provided better conditions for promoting the learners’ writing ability. Our study differs from theirs in three aspects. First, 16 language learners were involved in their study which is a threat to generalizability. Moreover, their participants were university graduates. Further, their control group wrote collaboratively, while in the present study the control group wrote individually.

Li and Zhu (2017) worked on dynamic interactions in wiki-based collaborative writing. The participants of the study were two small groups of students at a research university in the southeast U.S.A. They studied the patterns of interaction that occur during the collaborative wiki-writing tasks of small groups of ESL students and the socio-cultural factors accounting for the interaction dynamics. They referred to two notions of sociocultural theory (SCT) named scaffolding and mediation. Examining the interactions of small groups in wiki collaborative writing and wiki

| Table 1. Comparison of asynchronous communication tools |
|-------------------------------------------------------|
| **Wikis** | **Blogs** | **Threaded Discussions** |
| Collaborative authorship | Single author | Multiple authors |
| Dynamic | Static | Static |
| Nonlinear and multipage Construction | Linear Construction | Threaded construction |

*Note: Reprinted from Using wikis for online collaboration: The power of the read-write web, by West and West (2009), p 5. San Francisco, Jossey-Bass*
products of students in an EAP course at a research university in the U.S., they concluded that their study discovered a dynamic nature of interaction patterns. The results showed that the communication style and the use of language to scaffold peers can influence patterns of interaction. They also concluded that writing tasks interacted with sociocultural features including learners’ agency and emotion.

Ramanair et al. (2017) investigated collaborative writing using wikis with an emphasis on tertiary students’ perspectives. The participants of the study were 50 undergraduate students at a public university in Malaysia. They did the study to examine if the use of wikis helped learners’ interaction when writing their academic assignments. They also studied the ease of use of the wiki and learners’ motivation to use them. The results of the study showed that wiki assisted learners to interact better while writing their academic assignments. They also concluded that students were satisfied with using wikis.

Vahidipour and Rezvani (2017) conducted a study on the impact of using wikis on the accuracy of Iranian learners’ writing skills. The participants of the study were 50 intermediate EFL learners in Isfahan, Iran. They made an attempt to investigate if using wikis could improve the accuracy in the writing skills of learners. They also explored the EFL learners’ attitudes toward providing feedback. Regarding the learners’ attitudes, the results showed that the majority of language learners in the experimental group were willing to use wikis to improve their writing because they could learn from other learners’ mistakes. Further, they were of the opinion that collaborative work would produce better and more effective results.

Elabdali (2016) investigated the wiki-based collaborative writing in the ESL classroom. The study involved nine students taking a creative writing course in an intensive English program at a large university in the U.S. She combined three major influences on L2 writing including technology, creative writing, and collaborative writing. Examining the collaboration of students through wiki discussions and revision history, she compared individual short stories and collaborative short stories to see their differences in terms of creativity, accuracy, and complexity. The participants believed that the study helped them learn more words and practice grammatical structure better. They also asserted that creative writing tasks especially wikis empower them to have a sense of agency and authenticity.

Li et al. (2014) explored the effects of a wiki-based collaborative process writing pedagogy on writing ability and writing attitudes of students. The participants were two groups of four primary students in Shenzhen, China. The results showed that using the wiki had a positive but not significant effect on students’ writing ability. The results also indicated that the use of wikis significantly impacted students’ writing attitudes.

Ahmadi and Marandi (2014) conducted a study on two 16-member groups of EFL students at the Jihad-e-Daneshgahi institute of higher education in Iran. The students in the wiki group wrote an essay and other students edited it and then they wrote the final version by comparing the original edited versions. The students in the paper-based group had a reviewing-editing session before the next class to edit their peers’ essays. The results of their study showed that the collaborative wiki group outperformed the non-wiki group. One difference of their study from the current study was that the students in their control group edited each other but in the present study they were corrected by the teacher. Their study is also different from the current study because the participants of their study were college students. Likewise, the learners’ attitudes toward the use of wikis were not investigated in their study.

Wang and Lee (2013) performed a study on EFL college students’ perceptions, engagement, and writing developments in a wiki-based collaborative writing project. Two classes of sophomore college students from two Taiwanese universities participated in the study. The results of their study showed that the general perceptions of participants toward wiki were positive and the
students were satisfied with collaborating with peers. They also concluded that participating in a common project was challenging for students, and students’ engagement varied because of their different levels of proficiency in English.

Wichadee (2010) studied the use of wikis to develop summary writing abilities of students in EFL classes. The target group was 35 students in the first semester of the academic year 2010 at Bangkok university. He investigated whether collaborative on-line wikis could improve summary writing of an entire class. He also delved into the learners’ attitudes toward wikis and the obstacles they faced while using wikis. The results of his study suggested that wikis are effective learning tools that can improve students’ writing skills. Even though the students encountered some confounding variables such as the inconvenience of using computers, the great majority of them maintained that using wikis was a good experience.

3. Method

3.1. Design of the study
The current study employed a mixed-methods approach with a pre-test, treatment, and post-test experimental design to address the research questions. The data obtained from language learners’ writing were analyzed quantitatively. Furthermore, descriptive statistics were used to analyze and tabulate the 18 items of the questionnaire. Besides, thematic analysis was adopted to unearth the main themes concerning the language learners’ perspectives on the use of wikis. Furthermore, field notes were used to triangulate the data gleaned from the questionnaire data.

3.2. Participants
The participants of the study were 82 female and male language learners selected through convenience sampling from a language institute in Gachsaran, Iran where the lead researcher works as an English instructor. They were at a pre-intermediate level based on the Oxford Quick Placement Test administered prior to conducting the study. Noteworthy to mention is that, 10 of the participants dropped out of the study and the remaining 72 language learners continued until the end of the study. The participants studied at the 8th grade level in this institute with level 12 being the last. The participants ranged in age from 12 to 16, and all of them were high school students. The nationality of the learners was Iranian with Persian as their first language. Therefore, the participants were comparable regarding their level of language competence, age range, and first language. As the participants were almost at the same level of language proficiency, they were assigned into two groups of control and experimental. The control group (n = 36) underwent a traditional method of writing, while the experimental group (n = 36) was subjected to wiki-based collaborative writing.

3.3. Instruments
Four instruments were adopted in the current study. The first instrument was the Oxford Quick Placement Test (OQPT) utilized to homogenize the language learners. The test consists of 60 multiple-choice items constructed by Oxford University Press and the University of Cambridge.

The second instrument was a wiki site created by the main researcher of the current study. It is a collaborative site through which students could share their writing assignments to be corrected and edited by other members of the group.

The third instrument used in this study was a post-task attitude questionnaire adapted from Li (2014). The original questionnaire included 22 items, 4 of which were suggested to be discarded by a panel of three applied linguistics experts who were asked to check the questionnaire items concerning content validity. The items removed from the questionnaire were deemed unrelated to the study. Therefore, the questionnaire in this study consisted of 18 items on a five-point Likert scale and four short answer questions. Numbers 1, 2, 3, 4, and 5 were allocated to strongly disagree, agree, neutral, agree, and strongly agree, respectively. The internal consistency of the
scale was equal to 76 in Li's (2014) study. The whole questionnaire consisting of 18 items and the four open-ended questions were translated into Persian by the main researcher and verified by a certified translator. The Cronbach’s alpha reliability of the translated version of the questionnaire appeared to be .73 which was an appropriate level. To ensure the content validity of four open-ended questions, the main researcher asked three experts in the field to check the items for appropriateness. Their comments were taken into account and the final version was prepared.

Non-participant observations and field notes constituted the fourth instrument of the present study. Mackey and Gass (2005) defined field notes as key dimensions, “which can involve detailed impressions of the researchers’ intuitions, impressions, and even questions as they emerge” (p. 175). To gain deeper insights into language learners’ involvement in the wiki, key events associated with language learners’ attitudes toward the use of wikis and their behaviors (feedback, scaffolding) during observation sessions were written in the form of field notes for further elaboration and analysis. The notes were basically descriptive and reflective depicting accounts of events, language learners’ written portraits, and the main researcher’s reflections (Bryman, 2008). The researcher tended to adopt a non-participant role engaging very little in tasks being performed.

3.4. Piloting the questionnaire
The questionnaire was pilot-tested on 20 EFL learners to fine-tune the final version. These participants were not included in the final sample. The internal consistency of the questionnaire was calculated using Cronbach’s alpha (α = .845). Given that the Cronbach’s alpha coefficient of .70 or higher is indicative of a good degree of reliability (Salkind, 2007), the questionnaire was deemed reliable in the context of language teaching in Iran.

3.5. Data collection procedure
The data were collected based on the writing activities of the control and experimental groups. The participants of the control group were exposed to conventional methods of writing. They attended 16 sessions over a period of 8 weeks during which they were given writing assignments on specific topics according to their coursebook (Top Notch 3A). The teacher emphasized the writing sections and taught them more comprehensively than other parts. These parts included writing booster, grammar booster, summary writing, and vocabulary. This group did not use the wiki, and the teacher provided them with a topic to write about both in and out of the class. In the first sessions, the teacher provided instruction to the language learners on principles of writing including format, mechanics, and paragraph development (e.g., developing a topic sentence and supporting an opinion) in different genres of writing e.g., classification, comparison, and contrast. The students were also taught how to develop different parts of the composition, namely introduction, body, and conclusion. The language learners were presented with specific topics e.g., different modes of transportation, types of pollution, and different inventions to write about. For example, they were asked to describe the advantages and disadvantages of the topics in question or their impacts on human life. Sometimes the participants were given time to perform the writing task in the class. Upon completing the task, the students were provided with descriptive and evaluative feedback by the teacher. Due to the time constraints in the class, the teacher assigned a writing task to the students to perform later at home. They delivered the assignments in the following session. The students did not provide feedback to each other. Here, the teacher corrected their papers and provided them with written feedback. This group was given a pre-test before the study and a post-test after the survey. Two samples of the control group’s writing products were given as Appendix A. The results of the two tests were then compared to examine whether they changed significantly or not. The experimental group also attended the classes for 16 sessions that lasted 8 weeks. The coursebook of this group was also the same as the traditional group. Using Google sites, a wiki page was created first by the teacher, and the students were invited to join the site. The teacher created an account for each member and gave a user name and a password to each of them to enter the wiki site in which they had two writing assignments every week. This group uploaded their writing as images in formats including jpg, png, and alt text on the site. The size of uploaded pictures needed to be less than a specific size, therefore, the students were asked to install an
application called “reduce photo size” to reduce the size of the large pictures before being uploaded. In the first treatment session, the teacher explained what the students were supposed to do. They were then instructed on wiki-based writing and what they needed precisely do in their assignments through the wiki. They were also guided on how to give feedback on their classmates’ writing assignments. Here again, the teacher instructed the learners on the principles of writing as described in the control group. Noteworthy to mention is that the writing topics were identical to the ones covered in the control group. However, the students posted their writing assignments on the wiki pages where all the participants were supposed to read their classmates’ assignments and give feedback to each other through the wiki and corrected each other’s mistakes.

Their correction included different things such as the organization of the paper, grammatical mistakes, pronunciation mistakes, and word order. They also provided each other with different synonyms or antonyms for words that were appropriate to use in the context. Sometimes they guided their classmates to use correct conjunctions such as coordinating conjunctions, subordinating conjunctions, or correlative conjunctions. They could help each other to make grammatically correct sentences. The students’ samples of the writing products were given in Appendix B.

The wiki site includes parts such as discussion, edit, and history which were used by learners in giving feedback to their classmates. Each of these wiki functions had some unique features that were explained through a PowerPoint file to the participants. For example, by using the edit function, the learners edited their classmates and by using discussion function they could discuss the topics. Through the history part, the previous writings of students were available to observe by teachers and learners. To edit the papers, the students could go to a section called “special pages” and from its menu, they could go to the “file list” to select the picture they wished to edit. Before editing, students were asked to confirm their emails to be allowed for edition.

The experimental group was also given a pre-test and a post-test, the results of which were compared to examine whether they changed significantly or not. In the next step, the results of the post-tests of both control and experimental groups were compared to see whether they were significantly different or not in terms of writing fluency. Johnson and Street (2013) viewed writing fluency as writing with accuracy and speed. In this paper, however, writing fluency is conceptualized primarily as text quantity or the amount of production in a writing sample (Baba, 2009; Polio, 2001). To check the writing fluency, a standard measure taken from Biria and Karimi (2015). That is, the average number of words, T-units, and clauses of each composition were calculated.

To collect information about the language learners’ attitudes toward the use of the wiki after the experiment, a questionnaire was administered to them. Their attitudes were evaluated based on their responses given to the questionnaire items. The language learners were also required to provide short answers to the four open-ended questions in the questionnaire. It took them approximately 5, and 15 minutes to fill out the questionnaire and to provide answers to the four open-ended questions, respectively. To establish confidentiality, we used LL1 (Language learner 1), LL2 ... LL 36 to refer to their written responses.

### 3.6. Data analysis procedure

The three aspects of writing fluency, i.e. the number of words, the number of clauses, and the number of T-units in the pre-tests and post-tests of the two groups were compared using three paired samples t-tests to examine if wiki-based collaborative writing significantly enhanced EFL learners’ writing fluency. An independent sample t-test was employed to compare wiki-based collaborative writing and traditional method of writing. Descriptive statistics were used to analyze the respondents’ responses to the questionnaire items. That is, the learners’ scores were considered to interpret their attitudes toward wiki-based instruction. The students’ responses to the open-ended questions in the questionnaire were analyzed qualitatively through thematic analysis (Dörnyei, 2007) in which the frequent patterns were coded. The codes were analyzed semantically. The main themes and sub-themes were formed and subjected to frequency analysis. The data
were analyzed in Persian by the main researcher. To report language learners’ perspectives, the main themes, and the associated sub-themes, the main researcher translated them into Persian. Attempts were made to maintain the original meaning. A certified English translator checked the English translations. Finally, observation field notes were reviewed for the triangulation of the data. The field notes taken by the main researcher yielded significant insights into language learners’ attitudes toward the use of wikis and also their behaviors while undertaking the writing assignments.

4. Results

4.1. Results of the first research question

To examine whether the wiki-based group’s writing fluency significantly improved after the treatment, the number of words, the number of T-units, and the number of clauses were calculated. To compare the results of the wiki-group before and after the treatment, three paired t-tests were run. Table 2 depicts the pertaining results.

The sig. values of paired samples t-test between the pre-test and post-test results of the wiki-group regarding the three items, i.e. number of words, number of T-units, and the number of clauses are significant (sig. = .00, P < 0.05). The eta squared statistics for the number of words, the number of T-units, and the number of clauses turned out to be .94, .96, and .96, respectively all of which indicated large effect sizes.

To investigate if there were significant differences between the wiki-based collaborative writing (experimental group) and traditional context writing (control group) in terms of the three aspects of writing fluency, i.e. the number of words, the number of T-units, and the number of clauses, three independent samples t-tests were performed. Table 3 displayed the pertaining results.

As it is shown, the two groups did not have any significant difference in the pre-test regarding the three aspects of fluency, but there was a significant difference (sig = .040, p < 0.05), in the post-test regarding the number of words. The magnitude of the difference in means was very small (eta squared = .049). They were also significantly different (sig = .013, p < 0.05) regarding the number of T-units. The eta squared statistic (.88) showed a moderate effect size. Likewise, there was a significant difference between the two groups (sig = .000, p < 0.05) in terms of the number of clauses. The magnitude of the difference, the eta squared, was calculated which turned out to be .006 indicating a small effect size.

4.2. Results of the second research question

To explore Iranian EFL learners’ attitudes toward wiki-based collaborative writing, the participants responded to the questionnaire of the study. Table 4 shows the descriptive statistics of the 18 items of the questionnaire in the descending order.

As the average score fell between 1 to 5, a score of 3 was considered as the mid-point. Following Table 4, the great majority of language learners held welcoming attitudes toward the use of wikis. This is quite obvious from the responses given to the questionnaire items. For instance, the mean scores of 16 out of 18 items of the questionnaire turned out to be greater than 3 indicating the great satisfaction of language learners with the use of wikis. The highest mean score (Mean = 4.11, SD = .85) was ascribed to item 12 showing that 94.4 percent of language learners are actively involved in communication and discussion. Moreover, 92.7 percent of language learners perceived that wiki collaborative writing helped them attend to content development (Mean = 3.97, SD = .97) and language use (Mean = 3.97, SD = .97). However, the lowest mean score (2.31) pertained to item 18 in which 69.5 percent of the language learners held that not all the members in the group contributed to this project equally.
Table 2. Results of Paired Sample t-Test for Comparison of Wiki-group Writing Fluency in Pre-tests and Post-tests

| variable            | Std. Deviation ± Mean | Mean Differences | Paired Samples Test results |
|---------------------|-----------------------|------------------|----------------------------|
|                     | Wiki group pre-test   | Wiki group post-test | t   | df  | Sig. (2-tailed) |
| Fluency             | 19.36 ± 226.94        | 20.56 ± 246.69   | 19.750 | 43.415 | 35   | .000 |
| Number of T-units   | 4.73 ± 17.39          | 5.53 ± 23.06     | 5.667  | 33.524 | 35   | .000 |
| Number of Clauses   | 4.71 ± 23.31          | 5.84 ± 32.75     | 9.444  | 31.008 | 35   | .000 |
Table 3. Results of Independent Sample t-Test for Wiki Group and Traditional Group in Pre-tests and Post-tests

| variable      | Wiki       | Traditional | Independent Sample t-test |
|---------------|------------|-------------|---------------------------|
|               | Mean       | Std. Deviation | Mean       | Std. Deviation | t  | df | Mean Difference | Sig. (2-tailed) |
| Pre-test      | 226.94     | 19.36       | 229.92     | 20.36         | -0.635 | 70 | 2.42          | 0.528          |
| Post-test     | 246.69     | 20.56       | 237.58     | 19.85         | 1.913   | 70 | 5.11          | 0.040          |
| Number of T-units |           |             |            |               |         |    |               |                |
| Pre-test      | 17.39      | 4.73        | 18.22      | 4.92          | -0.732  | 70 | .83           | 0.466          |
| Post-test     | 23.06      | 5.53        | 19.89      | 4.94          | 23.002  | 70 | 3.17          | 0.013          |
| Number of Clauses |         |             |            |               |         |    |               |                |
| Pre-test      | 23.31      | 4.71        | 24.08      | 4.84          | -0.690  | 70 | .877          | 0.492          |
| Post-test     | 32.75      | 5.84        | 25.78      | 5.01          | 23.002  | 70 | 6.97          | 0.000          |
| Items                                                                 | SD | D | N | A | SA | Total | Mean | standard deviation |
|----------------------------------------------------------------------|----|---|---|---|----|-------|------|-------------------|
| 12 My group partners and I engaged in communication/discussion using the wiki. |    |   |   |   |    |       |      |                   |
| Frequency                                                            | 0  | 2 | 5 | 16| 13 | 36    | 4.11 | .854              |
| percent                                                             | 0  | 5.6| 13.9| 44.4 | 36.1| 100%  |
| 5 Wiki collaborative writing helps me attend to content development. |    |   |   |   |    |       |      |                   |
| Frequency                                                            | 0  | 3 | 8 | 12| 13 | 36    | 3.97 | .971              |
| percent                                                             | 0  | 8.3| 22.2| 33.3 | 36.1| 100%  |
| 6 Wiki collaborative writing helps me attend to language use.        |    |   |   |   |    |       |      |                   |
| Frequency                                                            | 0  | 3 | 8 | 12| 13 | 36    | 3.97 | .971              |
| percent                                                             | 0  | 8.3| 22.2| 33.3 | 36.1| 100%  |
| 8 I used the group wiki “History” module to view changes before I revised/edited the group writing. |    |   |   |   |    |       |      |                   |
| Frequency                                                            | 1  | 4 | 5 | 11| 15 | 36    | 3.97 | 1.134             |
| percent                                                             | 2.8| 11.1| 13.9| 30.6 | 41.7| 100%  |
| 7 Wiki collaborative writing helps me attend to essay structure/organization. |    |   |   |   |    |       |      |                   |
| Frequency                                                            | 0  | 3 | 8 | 13| 12 | 36    | 3.94 | .955              |
| percent                                                             | 0  | 8.3| 22.2| 36.1 | 33.3| 100%  |

(Continued)
| Items | SD | D | N | A | SA | Total | Mean | Standard deviation |
|-------|----|---|---|---|----|-------|------|-------------------|
| 11    | 0  | 4 | 7 | 13| 12 | 36    | 3.92 | .969             |
| 1     | 0  | 6 | 5 | 12| 13 | 36    | 3.89 | 1.090            |
| 3     | 0  | 4 | 8 | 13| 11 | 36    | 3.86 | .990             |
| 2     | 1  | 4 | 8 | 12| 11 | 36    | 3.78 | 1.098            |
| 10    | 1  | 3 | 8 | 15| 9  | 36    | 3.78 | 1.017            |
| 14    | 0  | 4 | 9 | 14| 9  | 36    | 3.78 | .959             |

(Continued)
| Items                                                                 | SD | D  | N  | A | SA | Total | Mean | standard deviation |
|----------------------------------------------------------------------|----|----|----|---|----|-------|------|-------------------|
| 4  Wiki-based collaborative writing improves my writing skills.       | 2  | 4  | 7  | 11| 12 | 36    | 3.75 | 1.204             |
| Frequency                                                            |    |    |    |   |    |       |      |                   |
| percent                                                              | 5.6| 11.1| 19.4| 30.6| 33.3| 100%  |      |                   |
| 13 My group partners and I often discussed the group writing outside | 0  | 4  | 11 | 12| 9  | 36    | 3.72 | .974              |
| the wiki (e.g., via face-to-face conversations, emails, online chat, |    |    |    |   |    |       |      |                   |
| etc).                                                                |    |    |    |   |    |       |      |                   |
| Frequency                                                            |    |    |    |   |    |       |      |                   |
| percent                                                              | 0  | 11.1| 30.6| 33.3| 25  | 100%  |      |                   |
| 16 I valued the insights that my group partners brought to this      | 1  | 5  | 8  | 12| 10 | 36    | 3.69 | 1.117             |
| project.                                                             |    |    |    |   |    |       |      |                   |
| Frequency                                                            |    |    |    |   |    |       |      |                   |
| percent                                                              | 2.8| 13.9| 22.2| 33.3| 27.8| 100%  |      |                   |
| 9  I found the group wiki “Discussion” module useful for communi-     | 2  | 7  | 23 | 3 | 1  | 36    | 2.83 | .775              |
| cating tasks with group partners.                                     |    |    |    |   |    |       |      |                   |
| Frequency                                                            |    |    |    |   |    |       |      |                   |
| percent                                                              | 5.6| 19.4| 63.9| 8.3| 2.8 | 100%  |      |                   |
| 15 I do not think my group partners valued my contributions.         | 2  | 19 | 11 | 4 | 0  | 36    | 2.47 | .774              |
| Frequency                                                            |    |    |    |   |    |       |      |                   |
| percent                                                              | 5.6| 52.8| 30.6| 11.1| 0  | 100%  |      |                   |
| Items                                                                 | Frequency | SD | A | N | Total | Mean | Standard Deviation |
|----------------------------------------------------------------------|-----------|----|---|---|-------|------|--------------------|
| 17 My group partners and I did not reach a consensus on the final products easily. | 2         | 5.6 | 55.6 | 2 | 11    | 1    |
| 18 All the members in my group contributed to this project equally.    | 2         | 5.6 | 68.9 | 9 | 23    | 9    |
| **Total**                                                             | **36**    | **30.6** | **30.6** | **2.8** | **2.8** | **36** | **100%**          |
| **Mean**                                                              | **2.44**  | **.809** | **2.44** | **.809** | **2.44** | **.809** | **100%**          |
| **Frequency**                                                        | **36**    | **2.8** | **2.8** | **36** | **100%** | **36** | **100%**          |
| **Percent**                                                          | **100%**  | **100%** | **100%** | **100%** | **100%** | **100%** | **100%**          |
The mean score of learners’ attitudes toward using wikis was calculated to be 3.56. Considering the test value of 3 as the mid-point of the attitude mean score on a five-point Likert scale and the mean difference (.56), the learners’ overall attitudes as depicted in Table 5 was significantly positive (sig. = .00).

Concerning the four open-ended questions in the questionnaire, the responses of all 36 participants of the wiki-group were collected and then analyzed using thematic analysis. It is worth mentioning that the four open-ended questions happened to form our main underlying themes including language learners’ attitudes toward using wikis, benefits of using wikis, problems associated with using wikis, and language learners’ suggestions on using wikis.

The first theme pertained to the language learners’ attitudes toward the use of wikis. Table 6 summarizes the themes and sub-themes associated with the language learners’ perceptions of wikis.

In response to the first question “What is your overall impression of collaborative writing using wikis?”, three different attitudes were identified.

First, an overwhelming majority of language learners viewed the use of wikis as positive. This group held strongly favorable attitudes toward the use of wikis. For example, the great majority of participants strongly agreed that wiki-based writing was beneficial (75%), motivating (72%), and interesting (72%) for English learning. Likewise, 69% of the language learners believed that the wiki created a competitive atmosphere. In a similar vein, 15 language learners stressed the significance of the wiki as a self-regulated language learning tool. More than half of the language learners (58%) asserted that the wiki provided them with a rich collaborative learning environment.

### Table 5. Results of One-Sample t-test of the Mean Attitude of Learners Toward Using Wikis

| Mean   | Std. Deviation | t     | df   | Sig. (2-tailed) | Mean Difference |
|--------|----------------|-------|------|-----------------|-----------------|
| attitude | 3.5664          | .24082 | 14.111 | 35              | .000            | .56636          |

Test Value = 3

### Table 6. Language Learners’ Attitudes Toward the Use of Wikis

| Main theme(s) | Sub-themes         | Frequency | Percentage |
|---------------|--------------------|-----------|------------|
| Positive      | Useful             | 27        | 75         |
|               | Motivating         | 26        | 72.2       |
|               | Interesting        | 26        | 72.2       |
|               | Competitive        | 25        | 69.4       |
|               | Self-regulative    | 15        | 41.6       |
|               | Collaborative      | 21        | 58.3       |
|               | Informative        | 21        | 58.3       |
|               | Relaxing           | 15        | 41.6       |
| Negative      | Time-consuming     | 7         | 19.4       |
|               | Not private        | 6         | 16.6       |
|               | Boring             | 5         | 13.8       |
|               | Stressful          | 7         | 19.4       |
| Neutral       | Positive and negative | 4    | 11.1       |
The second group was language learners who held unfavorable attitudes toward the use of wikis. They lacked the motivation and interest to actively participate in collaborative writing. For example, some participants were of the opinion that the wiki was time-consuming (19%) and stressful (19 %). About 16 % of participants did not like their writing tasks to be seen by others. The third group of language learners held both positive and ambivalent attitudes toward the use of wikis. Their motivation kept changing depending on the writing tasks assigned. Taken together, the great majority of the language learners expressed that wikis could improve their writing ability and team collaboration skills. The following are some of the language learners’ accounts on the use of wikis:

*My general idea about wikis is that it can help me write better, I think wiki sites encourage me to improve my writing.* (LL4)

*I very much like to see the ideas of my classmates and find out how they have expressed their thoughts on the topic.* (LL22)

*It is useful to check the wiki history page and follow editions made to the writing tasks. We can learn a lot from others.* (LL 23)

*I am positive about using wikis, but sometimes I face problems writing on the wiki. I feel a bit frustrated.* (LL 10)

*The wiki entails a lot of useful information concerning writing which is easily available. This information can serve as a guide for language learners.* (LL 5)

*We have limited facilities for the use of wikis. This makes it difficult for us to write on the wiki.* (LL 5)

The second theme concerned the benefits of wiki-based writing. The themes and sub-themes associated with the benefits of using wikis are summarized in Table 7.

Regarding the second question which read “what did you like about collaborative writing using wikis?”, most of the learners responded that they liked the novelty (69 %) and creativity (69 %) of wikis that made them interested in experiencing a new way of learning. They enjoyed writing with peers and peer editing (72 %) and felt that writing in the wiki contributed to their writing progress and

| Table 7. Language learners’ attitudes toward the benefits of the use of wikis |
|---------------------------------|----------------|--------|--------|
| **Main theme(s)**               | **Sub-themes** | **Frequency** | **Percentage** |
| Benefits                        | Foster creativity | 25 | 69.4 |
|                                 | Makes learners accountable | 17 | 47.2 |
|                                 | Enhance interpersonal communication | 20 | 55.5 |
|                                 | Raise self-confidence | 21 | 58.3 |
|                                 | Love peer editing | 26 | 72.2 |
|                                 | Develop friendship | 25 | 69.4 |
|                                 | Promote student autonomy | 22 | 61.1 |
|                                 | Availability | 18 | 50.0 |
|                                 | Novelty | 25 | 69.4 |
|                                 | Raise motivation | 21 | 58.3 |
their accountability (47%). Most language learners commented that the wiki enhanced friendship (69%) and interpersonal communication (55%). They also believed that the wiki is a collaborative platform that promoted their independence (61%), motivation (58%), and self-confidence (58%). Half of the participants (50%) pointed to the availability of the wiki saying that it is at their disposal to perform writing tasks. The following are some of the language learners’ excerpts:

Ever since I have used wikis, I guess, I have improved my self-confidence. Using wikis now, I can say I am more independent and motivated. (LL 31)

In the beginning, I did not like others to read my writings. I was feeling stressed about others correcting my writings. Now, I feel good about it. I can say, writing on the wiki, has improved my communication skills and confidence. (LL 7)

Wikis are totally different from what we had before. There is a big difference between this approach and the traditional methods of writing. (LL 1)

What made me interested in using wikis is the ties of friendship struck up among our classmates. I guess, after a while, we could trust each other.

(LL 9)

The third question explored what the language learners did not like about using wikis. This question formed our third theme, that is, problems of using wikis. Table 8 illustrates the sub-themes concerning the issues associated with the use of wikis.

Some of the participants (16%) responded that some students did not spend time to cooperate with others. They also stated that sometimes the interruption in internet service while using the wiki made them upset. Some language learners (25%) pointed to the technical issues of the wiki. They (16%) also referred to the asynchronous nature of the wikis as a drawback to using them. The lack of monitoring on side of teachers (27%) and the lack of time (27%) were among the issues they encounter while using wikis. About 25% of language learners did not feel good about peer corrections. Some (25%) found the use of wikis difficult. Some of the language learners’ perspectives concerning the problems of wikis are as follows:

Sometimes I did not have access to the internet and it annoyed me. I needed to wait for a long time. (LL2)

Some students were indifferent about writing tasks on the wiki. They were not willing to cooperate well with others. Also, some students took exception to the peers’ feedback and corrections. (LL 14)

| Main theme(s) | Sub-themes                      | Frequency | Percentage |
|---------------|--------------------------------|-----------|------------|
| Problems      | Asynchronous                    | 6         | 16.6       |
|               | Technical inconveniences         | 9         | 25         |
|               | Feel bad about peer correction  | 8         | 22.2       |
|               | Difficult to use                | 9         | 25         |
|               | Lack of cooperation             | 6         | 16.6       |
|               | Lack of monitoring              | 10        | 27.7       |
|               | Lack of time                    | 10        | 27.7       |
Sometimes I tried to upload my paper but it took a lot of time. Sometimes I failed to send it because of poor internet network. I was really tired of that. (LL 9)

I did not feel good about being corrected by my classmates, because some of them were not good at English. Most of the corrections were made by my classmates. (LL 23)

Most of us are high school students, and we are loaded with too much homework to do. This makes us spend a little time writing on the wiki. (LL 30)

The fourth theme emerged from the last question concerned language learners’ suggestions about using wikis in the future. Table 9 depicts the summary of the sub-themes related to language learners’ suggestions about the use of wikis.

All the language learners made some suggestions for wiki writing practice in English language courses. These suggestions were encapsulated into three sub-themes depicted in Table 9. The majority of language learners (80%) recommended that using wikis should be an obligatory part of language learners’ work. They also held that principals of language institutes should try to encourage and facilitate using wikis in English learning classes. Likewise, 75% of the language learners suggested that the culture of using wikis should be promoted. About 52% of them stated that wiki-based writing should account for a portion of the writing score and that evaluation through the wiki should be taken more seriously.

What follows are some quotes about the language learners’ suggestions about using the wiki in the future:

Language institutes should be provided with well-equipped computer facilities to enhance the potential of wikis. Being equipped with these facilities, teachers can monitor students’ learning easily. (LL 5)

Language institute managers and language teachers need to encourage and enhance the wiki culture. (LL 22)

Teachers should emphasize more on wikis in the future. The use of wikis should be a part of school/language institute curriculum (LL32)

I think language teachers should use wikis as an essential part of the class. Besides, I guess, teachers need to assess language learners’ writing tasks on the wiki so that learners are familiar with scoring criteria. (LL 20)

5. Teacher’s field notes and observations

To deeply explore language learners’ attitudes concerning the use of wikis and their behaviors and to triangulate the results of the questionnaire data and the four open-ended questions, the lead researcher made some field notes, the summary of which are presented below:

| Main theme(s)          | Sub-theme                                | Frequency | Percentage |
|------------------------|------------------------------------------|-----------|------------|
| Suggestions            | Integration of wikis into the curriculum | 29        | 80.5       |
|                        | Promotion of the wiki culture            | 27        | 75         |
|                        | Evaluation                               | 19        | 52.7       |
All of the language learners stated that they had not worked with wikis in educational settings. It was interesting to observe that the language learners were motivated and excited about using wikis. In fact, they assisted each other with technical problems concerning the use of the wiki, especially during the first writing tasks. Some features stood out strikingly in their writing tasks. First, the language learners provided assistance with regard to vocabulary items and content. They were hesitant to correct directly the writing tasks in terms of grammar and structures compared to content and vocabulary. Second, feedback provided by the language learners were of descriptive nature rather than evaluative. Along the same lines, they encouraged their peers a lot by complementing their writing performance. They mostly used the phrase “keep up the good work” to motivate each other.

As the language learners were used to conventional methods of writing, they resisted writing on the wiki in the beginning sessions. At first, they found it demanding, but later they realized that it could enhance their motivation and self-confidence. They then uploaded their writing tasks with enthusiasm and were looking forward to more writing tasks to come. However, very few language learners appeared to have had unpleasant experiences while writing on the wiki, probably for poor internet connections. The majority of the language learners enjoyed the supportive atmosphere among peers. They displayed great willingness to learn from each other. The atmosphere was attractive and the language learners were deeply involved in the writing tasks. As time went on their confidence and motivation grew. They were also keen not to miss any of the writing tasks on the wiki. The interaction between the language learners while working on the writing assignments provided evidence of authentic dialogue, developing effective cooperation, and learning atmosphere. The evidence of progress was evident in their writing tasks especially in the last sessions reflecting that a new culture created through the use of the wiki. The student-student interaction was mostly collaborative. That is, they wrote collaboratively and their writing behaviors entailed instances of elaborating on each other’s content, editing, adding, and providing feedback. However, very few students preferred to write individually and displayed non-collaborative behaviors, i.e., neglecting peers’ feedback and edits. These learners mostly relied on proficient language learners’ assistance.

6. Discussion
The purpose of this study was to examine the impact of wiki-based collaborative writing on Iranian language learners’ writing fluency. The study also explored language learners’ attitudes toward the use of wiki-based collaborative writing.

6.1. Discussion of the first research question
Concerning the effect of collaborative wiki-based writing on the writing fluency of learners, it was observed that the experimental group outperformed the traditional group. This shows that the use of wiki sites can be useful in enhancing learners’ writing skills. The results of the study support those of Chao and Lo (2011) who suggested that wiki-mediated collaborative writing could surpass conventional paper-based writing because interactive writing activities were integrated into their classes that improved learners’ writing skills. This can be supported by the socio-cultural theory because helping peers can extend their writing knowledge. The results also agree with those of Zorko (2007) who stated that wikis empower students to construct their own knowledge without dependence on teachers and make language learners accountable for their own knowledge that can enhance their writing competence. In the current study, it also was confirmed that using wikis reduced the learners’ dependence on teachers resulting in their ability to write more competently. Therefore, a big part of the learners’ success is the result of this independence. The results are consistent with the study by Salaber (2014) in which wikis were found to have positive effects on the engagement and collaboration of students. The results of the current study are in line with those of Lee’s (2010) study in that wikis improve collaborative scaffolding which consequently helps them re-organize the content and correct errors. The improvement in content is directly related to the enhancement of learners’ writing fluency. The participants of this study also scaffolded their peers and provided direct and indirect feedback to their peers that improved
their writing ability. The results are also compatible with those of Wichadee's (2010) study and Gharehbagh et al.'s (2019) study in which using wikis was found to enhance language learners' writing skills and components.

Language learners' writing improvement can be justified on several grounds. First, their papers were read, reviewed, and corrected by all team members. Another possible line of explanation is that wiki technology promotes interactive and student-oriented learning and the development of learning communities. With the ubiquity of wiki devices, language learners can better improve their writing skills, and gain more autonomy in assisting their peers' learning. The language learners' writing improvement can also be reasonably justified on the grounds that the wiki is an effective device to motivate language learners to write collaboratively on a particular subject and that the wiki can enhance collaboration and peer scaffolding on the basis of learning theory of constructivism and scaffolding theory.

However, the results of the study are in contrast with the ones obtained by Yousop and Siti Mariam (2016) who was of the opinion that students were hesitant in using the wiki as a tool in their course because of some technical and personal problems. They found that using wiki did not improve the students' writing ability. The results are not in line with the ones in Li et al.'s (2014) study in which wikis positively but insignificantly affected learners' writing skills.

6.2. Discussion of the second research question
Based on the findings of the second research question, it can be seen that learner's attitudes toward wikis were positively affected. The learners became interested in collaborative wiki-based writing and tried to have more contributions to such projects. The results are in accord with those of Ramanair et al. (2017) in that wikis are valuable for students to spend time on. Our results are also in agreement with those of Salaber (2014) who believed that using wikis can have a positive effect on the learning environment. Further, Elabdali (2016) obtained the same results showing that creative writing tasks especially wikis made students have a sense of agency and authenticity. Along the same lines, Lai et al. (2016) concluded that the familiarity of learners with CALL could enhance students' confidence. The results of the study are also supported by the study conducted by O’Bryan (2008) which revealed that self-direction of learners in language classes can be enhanced through technological applications. Based on the results of the study, one of the factors that some students did not like about wikis was the lack of familiarity with wiki sites that can affect the attitudes of learners negatively. This is in accord with the study of Stoddart et al. (2016) in which familiarity with the software that students use, among some other factors, could affect their attitude positively or negatively. The overall impression of learners was that wikis could improve their writing ability. This was congruent with the studies performed by Woo et al. (2013), Wang and Lee (2013), Wichadee (2010), and Vurdien (2020) demonstrating that students held positive perceptions about the use of wikis. The findings of the study fit neatly with those of Chu et al. (2019) who found that wiki writing encourages a higher degree of, and more even participation and collaboration among second language learners. Consistent with our results, Gharehbagh et al. (2019) demonstrated that wiki-based writing raised language learners' motivation to learn English.

However, the results were in contrast with Yousop and Siti Mariam (2016) who found that students resisted using wikis because of some problems such as course design and technical barriers.

The results of the qualitative phase of the study including the four open-ended questions and the observation field notes bore out those of the questionnaire and indicated that the language learners were positively disposed toward the use of wikis.

7. Conclusion
The present study sought to investigate the effect of using wikis on language learners' writing fluency. It also explored their attitudes toward the use of wikis. The results showed that wiki-based
writing improved language learners’ writing fluency. Furthermore, the qualitative results including the thematic analysis of the four-open ended questions and the teacher’s field notes corroborated those of the questionnaire indicating that language learners held favorable attitudes toward using wikis in writing projects. Therefore, the study might prove productive in a fine appreciation of collaborative wiki-based writing by EFL teachers.

The results of the study might be used for course designers, curriculum writers, and educational policymakers in Iran to integrate wikis into English language teaching programs especially writing courses. In doing so, educational authorities should facilitate the application of wikis in EFL programs. Given the pivotal role of computer technology in education, language, teachers should examine effective ways of promoting the integration of wikis into the classroom.

Furthermore, language supervisors should strive to encourage EFL teachers to capitalize on wikis. That is, EFL teachers should be motivated to take advantage of wikis in their English courses.

This study may contribute to EFL teachers in that it can raise their awareness of wiki-based writing. Training on wiki-based writing for teaching English should be incorporated into teacher development and teacher education programs. These programs are required to take notice of EFL learners’ attitudes of the use of wikis to be effectively implemented by EFL teachers.

Equipped with computer-based facilities including wikis, language teachers can create an authentic language learning environment where language learners can develop their language skills and communicative competence. This calls for the attention of school or language institute principals to equip the classroom with the necessary facility-based supports.

More studies are still required to thoroughly explore the role of wiki-based writing in the context of language teaching. This study addressed wiki-based writing from the language learners’ perspectives. It would be fruitful to delve into EFL teachers’ perspectives toward the use of wikis as an instructional tool for teaching writing. Moreover, prospective researchers are suggested to study potential obstacles to the implementation of wikis in EFL settings.

There are several limitations in this study that should be acknowledged. First, the number of participants was limited and therefore the results may not be generalizable. Second, in the qualitative phase of the study, the participants responded to four open-ended questions which may not elicit all aspects of the issue. Thus, more research studies are called for to delve into language learners’ perceptions of wikis using semi-structured interviews.

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**References**
Ahmadi, S., & Marandi, S. (2014). The effect of using the social tool of wikis on EFL learners’ writing performance. *Journal of Education and Practice*, 5(37), 171-178. https://www.intel.org/journals/index.php/JEP/article/viewFile/18317/19005
Alshumaimeri, Y. (2011). The effects of wikis on foreign language students’ writing performance. *Social and Behavioral Sciences*, 28(3), 755-763. DOI: 10.1016/j.sbspro.2011.11.139
Aydin, Z., & Yildiz, S. (2014). Using wiki to promote collaborative EFL writing. *Language Learning and Technology*, 18(1), 160–180. http://llt.msu.edu/issues/feb2014/aydin-yildiz.pdf
Baba, K. (2009). Aspects of lexical proficiency in writing summaries in a foreign language. *Journal of Second Language Writing*, 18(3), 191–208. https://doi.org/10.1016/j.jslw.2009.05.003
Biria, R., & Karimi, Z. (2015). The effects of pre-task planning on the writing fluency of Iranian EFL learners. *Journal of Language Teaching and Research*, 6(2), 357–368. https://doi.org/10.17507/jltr.0602.16
The collaborative writing: A case study in an elementary Spanish course. CALICO Journal, 27(2), 260–276. https://doi.org/10.1016/j.calicoj.2017.11.002

Leuf, B., & Cunningham, W. (2001). The wiki way: Quick collaboration on the web. Addison-Wesley.

Li, M. (2013). Individual novices and collective experts: Collective scaffolding in wiki-based small group writing. System, 41(3), 752–769. https://doi.org/10.1016/j.system.2013.07.021

Li, M. (2014). Small group interactions in wiki-based collaborative writing in EAP context [A Ph.D. dissertation, The University of South Florida].

Li, M., & Kim, D. (2016). One wiki, two groups: Dynamic interactions across ESL collaborative writing tasks. Journal of Second Language Writing, 31, 25–42. https://doi.org/10.1016/j.jslw.2016.01.002

Li, M., & Zhu, W. (2017). Explaining dynamic interactions in wiki-based collaborative writing. Language Learning & Technology, 21(2), 96–120. http://llt.msu.edu/issues/june2017/zhwu.pdf

Liu, T., Chu, S. K. W., & Li, W. W. (2014). The effects of wiki-based collaborative process writing pedagogy on writing ability and attitudes among upper primary school students in Mainland China. Computers & Education, 77, 1–32. https://doi.org/10.1016/j.compedu.2014.04.019

Loo, S. M. (2013). Investigating face-to-face and computer-mediated out-of-class collaboration in an English for technical writing course in Malaysia [Doctoral dissertation, Victoria University of Wellington].

Mackey, A., & Gass, S. (2005). Second language research: Methodology and design. Lawrence Erlbaum Associate.

Mak, B., & Conian, D. (2008). Using wikis to enhance and develop writing skills among secondary school students in Hong Kong. System, 36(3), 437–455. https://doi.org/10.1016/j.system.2008.02.004

O’Bryan, A. (2008). Providing pedagogical learner training in CALL: Impact on student use of language-learning resources and toolbars. CALICO Journal, 26(1), 142–159. Ortega, L. (2009). Interaction and attention to form in L2 text-based computer-mediated communication. In A. Mackey & C. Polio (Eds.), Multiple perspectives on interaction (pp. 226–253). Routledge.

Polio, C. (2001). Research methodology in second language writing research: The case of text based studies. In T. Silva & P. K. Matsuda (Eds.), On second language writing (pp. 91–115). Lawrence Erlbaum.

Ramana, J., Rethinasamy, S., & Misrieng, J. (2017). Collaborative writing using wiki: Tertiary students’ perspectives. Electronic Journal of Foreign Language Teaching, 14(1), 84–101. http://e-flt.nus.edu.sg/v14n12017/ramana.pdf

Rott, S., & Weber, E. D. (2013). Preparing students to use wiki software as a collaborative learning tool. Calico Journal, 30(2), 179–203. https://doi.org/10.11139/cj.30.2.179-203

Salaber, J. (2016). Facilitating student engagement and collaboration in a large postgraduate course using wiki-based activities. The International Journal of Management Education, 12(2), 115–126. https://doi.org/10.1016/j.ijme.2014.03.006

Salkind, N. J. (2007). Encyclopedia of measurement and statistics. Sage Publications.

Stoddart, A., Chen, J. Y. Y., & Liu, G. Z. (2016). Enhancing successful outcomes of wiki-based collaborative writing: A state-of-the-art review of facilitation frameworks. Interactive Learning Environments, 24(1), 142–157. https://doi.org/10.1080/10494820.2013.825810

Storch, N. (2011). Collaborative writing in L2 contexts: Processes, outcomes, and future directions. Annual Review of Applied Linguistics, 31, 275–288. https://doi.org/10.1146/annurev-applied-031910-115006

Storch, N. (2013). Collaborative writing in L2 classrooms. Multilingual Matters.

Vohdidpour, R., & Rezvani, E. (2017). Impact of wiki-based feedback on grammatical accuracy of Iranian EFL learners’ writing skill. International Journal of Foreign Language Teaching & Research, 20(5), 111–123. http://jfla.univ.ac.ir/article_595925_6c4dbd9a72491f1f8b5a313d97858f41.pdf

Vurdien, R. (2012). Enhancing writing skills via mobile learning and wikis. In Zou, B., & Thomas, M. (Eds.), Recent developments in technology-enhanced and computer-assisted language learning (pp. 99–121). IGI Global. http://doi.org/10.4018/978-1-7998-1282-1.ch005
Appendix A

Samples of the control group’s writing products

![Samples of the control group’s writing products](image)

Samples of peer editing in the experimental group

![Samples of peer editing in the experimental group](image)
IN THE NAME OF ALLAH

Subject: How do you predict the world in 2030?

Everything is different in 2030, and technology has made a lot of developed and a new era for humans and technology. People will have a better life because technology has changed and scientists have been able to give people new and more technology.

At that time, the vehicles were changed, and humans will use cars that fly in the air. The population will increase dramatically, and more people will follow the one-child policy. Generation of only children growing up without brothers or sisters. The policy purpose was to stop increasing population from growing to last. Healthcare has improved and few people will die. But industrial machines will be replaced by them. Humans become more horrible because for their comfort. They will try to get more and more different things. But they do, however, without damage to their environment. Scientists believe that by the year 2030, one third of all animal species will be extinctions, and many animals will be at risk of extinction. Arctic ice melt and equatorial forests destroyed and disappear. Equatorial forests affects the global weather. Humans will destroy their own generations with their own hands. Humans be will suffer from severe water shortage.

In conclusion, in 2030, the world will have badness and you and this is the humankind who will decide for future generation.
"In the name of God"

Man is always in progress, thus progressions are good and also bad. So, the future is hard to predict. Don’t say improvement is bad and also can’t say it’s good, because we may continue using materials to improve and gradually come to ourselves and see things as nature tells.

On the other hand, it’s good because we can solve our problems by science and facts.

In my opinion, all of good and bad happenings are depend on each other. I mean, good things won’t happen until bad things doesn’t happen and vice versa. For example, we won’t solve the problem of water crisis until we experience it and take actions to improve.

By 2050, man can find Cancer treatment because the disease will increase, humans will travel to Mars because the world’s population is increasing, and will produce cars without drivers, all the people will have Internet, the problem of water, food and diseases in Africa will be solved.

But all of these good things cause unprecedented changes like oil, gas, water, and air to be bad for future. But according to advances of science and technology, human will find an alternative for them.

At the end, I think by 2050, people will have better life.

Sadaf Jamali 1379@gmail.com

User: Sadafjavid

line 7 you should delete “are” before “depend”. in line 8 vice versa should replace conversely.

you have written in a fairly good way but you haven’t written in suitable paragraphs.
In the name of God

Zohar Rajabi

In your prediction of the world into 2030:

1. Technology:
I think into 2030, nobody use the car or nobody work, and the robots do all the work. We use solar energy, and maybe it will not be world in 2030, but it will be better than the current world. Maybe there are no other fuels like oil.

2. Animals:
In the future, there is nobody in the future, but it is likely that by the year 2030 the evolution of some animals will end and some will disappear, and perhaps we will face new animals.

3. Treatment:
Maybe new treatments for diseases such as cancer or AIDS that cannot be cured today can be discovered in the future.

4. Plants:
Plants like animals, have different species and maybe look at new species in the future.

User: Zoharajabi

Write in a more complete manner about the subject. Division of your writing structure is not appropriate. There are also some mistakes. E.g., in line 1 use "in" instead of into. In the second line use replaces use to. In the last line will look replaces look.
