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The Impacts of Collaborative Writing on Individual Writing Skills

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Abstract
The current study was to see if collaborative writing activities would impact each student's writing quality after getting engaged in an academic writing course for argumentative essays. The study enrolled 62 third-year English majors at the Faculty of Foreign Languages, Van Lang University, Ho Chi Minh City, Vietnam, 35 in the experimental group and 27 in the control group. The ages of the students ranged from 19 to 21. All teaching/learning activities, such as the selection of topics, brainstorming, or peer/lecturer feedback, applied to train the students of the two groups were similar except for the essay-composing stage. While the control-group students composed an essay individually, the experimental-group students conducted it collaboratively. That is, the group members composed an essay together. Data from pre-and post-tests of students' writing were analyzed to compare the students' writing quality. The study discovered that jointly authored papers performed much better than those written alone and that collaborative writing activity significantly affected each student's writing quality.

Keywords Collaborative writing · Individual writing · Writing quality · Writing outcomes · Argumentative essays

Introduction

Writing is a complex and difficult activity requiring a person to use his/her ability to use the English language and articulate thoughts to the test (Nguyen & Nguyen, 2022; Norrish, 1983; Vu & Le, 2022). It is frequently viewed as a necessary ability for students to master in order to succeed academically. Writing demands not only coherence but also effectiveness. According to Tran (2021), Nguyen and Nguyen (2022), and Vu and Le (2022), Vietnamese students had many difficulties with their writing skills due to the fact that writing was not a focus of the curriculum. Homstad and Thorson (1996), otherwise, claim that students find writing in a foreign language to be a challenging and irritating exercise. Students frequently express reservations about incorporating this activity into or outside of the classroom. Language appears to be the most challenging aspect of a writing activity for the

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second language (SL) writers due to their inadequate language competency or linguistic expertise. Silva (1993) and Olsen (1999) assert that EFL writers cannot produce successful written work due to the gap in syntactic and lexical competence between students' first and second languages. According to Wang and Wen (2002), SL writers are inevitably stymied while writing in the English language, as their mother tongue has the greatest influence on how the second language is used. Olsen (1999) discovered that less skilled learners made more grammatical, syntactic, and lexical errors. Moreover, Bacha and Bahous (2008) claim that though students' language proficiency is good, it is not guaranteed that they can produce good written papers.

Researchers/lecturers have been trying to find ways to help students overcome their writing difficulties and improve their writing outcomes (Ngo & Tran, 2021). Vygotsky (1978) posits that learning the target language is a process of social-cultural activity. The Zone of Proximal Development states that students need to learn with the assistance of others. Hence, students can study better when they learn from each other and learn collaboratively. According to Foley and Thompson (2003), collaborative learning is necessary to develop students' capabilities in learning environments. Numerous writing-skills professors have included collaborative learning activities in their academic writing classes. Students are frequently instructed to collaborate on writing subjects, develop outlines, organize ideas, and provide peer evaluation to improve their writing quality. Most of these activities are conducted collaboratively in the classrooms. In this situation, collaborative writing activities that occurred in the classroom were not an exception. Storch (2011) asserts that researchers/lecturers around the world widely use collaborative writing activities because such activities will help create opportunities for students to learn more of the language. Wang (2015) found that students who were engaged in joint writing activities improved their writing skills and enjoyed this learning experience. To clarify this, Elola and Oskoz (2010) claimed that the student-writer had a reader in the collaborative activities, which encouraged him/her to pay more attention to the writing accuracy.

According to Erkens et al. (2005), collaborative writing in the classrooms requires student group members to share ideas to solve problems together. The group members need to be dependent on each other to search for information and resources, and they have to be willing to cooperate with other members to achieve a good product. However, Handayani (2012) points out that one of the problems in collaboration is the unbalanced contribution of the group members. Besides, disagreement between group members is another unavoidable issue when assigning students to do projects together. Erkens et al. (2005) suggest that to reach the target, group members need to share equal, cooperative work and share ideas. They should brainstorm, discuss, and negotiate to create a common framework for everybody in the group. Additionally, lecturers need to pay great concern when students conduct discussions in their groups and attempt to find the most appropriate measures for each student's contributions. Chen and Yu (2019) asserted that three primary elements influenced students' attitudes toward collaborative writing: group friendships, the perceived value of peer support, and English-learning beliefs and experiences.

Ansarimoghaddam et al. (2017) compare the interactions among learners between online (Wiki) and traditional collaborative modes and found that the students from both modes of collaborative writing obtained similar understanding in interaction, and they could learn from each other via developing and sharing the different perspectives on the interacting issues. However, to what extent collaborative writing affects the students' writing quality is a concern of many researchers (Pham, 2021), and it is also addressed in the article. The purpose of the current study was to investigate whether collaborative writing activities has any impact on the students' writing outcomes.

Literature Review

As demonstrated by the writing process approach, teaching writing activities normally include these activities as the students work together, such as selecting a topic, working together to brainstorm ideas, making an outline, composing a draft, peer editing, revising the draft, teacher feedback, and revising the second draft, then submitting the draft. To determine the efficacy and influence of jointly writing on the students' writing outcomes, Talib and Cheung (2017) conducted literature evaluations to find research published between 2006 and 2016 in reputable journals on the effectiveness and influence of collaborative writing on students writing quality. The analysis included 68 publications from 15 SSCI journals that published research on collaborative writing. The researchers interpreted and categorized data using a qualitative analytic methodology. The study demonstrates that research on collaborative writing categorized the last decade has demonstrated that this activity motivates students' learning engagement by helping them enhance their writing capabilities. In addition, the research found that when students work in groups, they produce shorter texts but more precise grammar and vocabulary. Furthermore, peer review activities helped students in the writing process interact and negotiate.

Quite a few research studies have investigated the quality of collaborative writing compared to that of individual writing. Storch (2005) allowed students to decide whether to compose their writing in pairs or individually. The study found that collaboratively written papers in pairs tended to be shorter in length, but vocabulary uses were more accurate, and the sentence structures looked better. In addition, the writing purposes in the collaboratively written papers were more focused. In deeds, this study was limited to analyzing the data in a single shot of written papers. More data analysis was found in Aminloo's (2013) study, which found that both collaborative and individually written papers improved in terms of writing quality, but the collaboratively written products were much better.

Dobao (2012) compared students' written papers on the identical writing problem under three different conditions: group work (n = 15), pair work (n = 15), and individual learning (n = 21). The study discovered that students working in four-person groups produced more accurate collaborative texts than those authored in pairs or independently. This finding corroborated McDonough et al. (2018), Zabihi and Rezazadeh (2013), and Biria and Jafari (2013) findings that jointly created outputs were more accurate than independently authored texts. Zabihi and Rezazadeh (2013), on the other hand, asserted that jointly produced articles did not offer superior sentence structures to those reported by Storch (2005). Zabihi and Rezazadeh (2013) and Biria and Jafari (2013) discovered that collaboratively authored papers were less fluent than those written separately.

Elola and Oskoz (2010) evaluated eight students who attended the East Coast University of the USA in terms of writing precision and fluency. The teachers assigned students to work in pairs according to their skill levels. Each student wrote two argumentative pieces, one on his or her own and one in collaboration with another. As with the other studies, this study's findings suggested that no significant difference was found in terms of fluency between solo and collaborative authored papers. Collaboratively prepared papers were more accurate than those authored alone. However, students who wrote essays alone improved their writing quality significantly between drafts 1 and 2, whereas jointly prepared papers showed no significant difference between drafts 1 and 2. The scope of this study was restricted by the fact that collaboratively written pairs were done, and student errors determined the accuracy of writing.

In a 16-week L2 writing course at a university in the emirate, Shehadeh (2011) examined the use of collaborative writing. Thirty-eight students, 18 in the experimental group and 20 in the control group, participated in this study. This study found that the influence of collaborative writing on the content, organization, and vocabulary of students' L2 is significant but does not alter the grammar or mechanics of written material. The experimental group's majority of students, in particular, expressed joy during collaborative writing assignments. Like the Storch study (2005), the effects of collaborative writing on individual students' outcomes have not been assessed.

Sajedi (2014) conducted a study to determine the efficacy of collaborative summaries. Writing on three groups of students, one worked independently (control group), another worked in pairs, and the third worked in three-student groups. However, the results of this study were different from Dobao's. Those students who worked in pairs gained more benefits than those who worked in groups of three or worked individually. In terms of writing improvement, Collaboratively produced texts by students in pairs and groups of three improved greatly in vocabulary, organization, and content but did not improve considerably relating to grammar or mechanics. This finding was consistent with that of Shehadeh (2011). However, Zhang (2018) found that collaboration did not improve students' writing products in accuracy, fluency, and text quality.

Kim (2008) compared collaboratively produced and independently authored papers in Korea and discovered that neither of the two writing situations was significantly different. However, post-tests revealed that word usage in jointly authored papers was superior. According to Watanabe and Swain (2007) and Dobao and Blum (2013), students gained valuable knowledge from one another during the discussion session in which they collaboratively created essays, and their post-test outcomes improved. Storch (2011) said that collaborative writing activities as academic writers could aid students in improving their academic writing quality. Dobao and Blum (2013) studied attitudes and perceptions about collective writing in pairs and small groups. The study found this structure favored by students who produced articles with peers since additional options for active participation were created. Those who generated written texts in groups observed that when working in this setting, they had more thoughts and expertise to give. Furthermore, most students have claimed that collaboration greatly influenced the grammatical and lexical accuracy of their joint writing.

Similar to the purpose of the current study, the influence of collaborative writing tasks on the quality of the individual writings of student writers was researched by Bikowski and Vithanage (2016). The study included 59 L2 authors, 32 in the experimental group and 27 in the control group at a major institution in the United States. While students in the control group composed writing alone, students in the experimental group collaborated were the difference between the two groups in terms of writing. According to the study's conclusions, both groups significantly improved their writing products. The experimental group's students, in particular, made considerable improvements in their individual written outputs as compared to the control group's students. One possible disadvantage of this study is that three instructors were involved in training the two groups. Two were assigned randomly to the experimental group, while the third was assigned to the control group.

Found that little research has investigated if collaborative writing was beneficial to EFL writing students, Villarreal and Gil-Sarratea (2019) examined if collaborative writing could help students create more effective texts. Sixteen students' argumentative writings were compared to those of 16 students who collaborated in pairs (control group) (experimental group). The study found that cooperative papers were shorter but more accurate and more lexical and grammatical than those created alone. In addition,

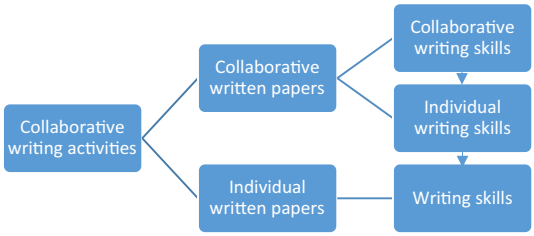

Fig. 1 The Conceptual Framework for the study

cooperatively produced papers received higher grades for content, structure, and organization. Working with the students to write ideas and to provide critique, all helping them build their talents in writing.

In order to measure the writing fluency of the students who conducted writing collaboratively, Pham (2021) investigated 62 second-year students to see if collaborative writing has any effects on the students' writing fluency. The control (n = 27) and experimental group (n = 35) employed similar writing processes, from braining storming, outlining to writing. One different was that the control group composed essays individually while it was written collaboratively by the students in the experimental group. The study found that collaborative writing activities affected both individually written papers and collaborative written papers in terms of writing fluency. However, this study failed to measure whether he collaboarive writing has any effects on the students writing accuracy, which is a research gap for the current study to fill in.

As discussed earlier, previous research studies such as Biria and Jafari (2013), Dobao (2012), Shehadeh (2011), Storch (2005), Sutherland and Keith (1999), McDonough et al. (2018), Sajedi (2014), Kim (2008), Le (2021), and Villarreal and Gil-Sarratea (2019) found that collaborative papers written by pairs or groups gained more effectiveness than those written individually. Pham (2021) measured the effects of collaborative writing on the students' writing fluency. However, few of these research studies examined whether collaborative writing activities had a discernible effect on the quality of individual writing. The current work attempted to close this gap in order to add to the body of knowledge. The current study tested two hypotheses. To begin with, collaborative writing activities significantly affected the quality of individual writing. Second, papers prepared collectively were superior to those produced separately. (See Fig. 1).

Research Questions

1. Do collaborative writing activities have any effect on individual writing quality?
2. Is there any difference in writing quality between students' collaboratively written papers and individually written papers?

Research Methodology

Research Context and Sample

This study was conducted at the Faculty of Foreign Languages, Van Lang University (FFL-VLU), Ho Chi Minh City, Vietnam. The FFL-VLU was established in 1995 by the very first Rector of Van Lang University. The total number of students at the FFL-VLU now was 3,200 students. For the present study, the population of the students was 240 junior English-majored students who enrolled in 6 classes of Writing-4. The ages of the students ranged from 19 to 21. Based on the national examination results, these students came from different parts of the country when they were admitted to one of the non-public universities. The current study used a convenience sampling method. Two intact classes were selected as samples for the current study. One class of 35 students, 21 females and 14 males was chosen for the experimental group. Some students from the control group did not agree to take part in the study, so the number of students in this class was smaller than the experimental group, with 27 students, 18 females and nine males. A staff member who teaches writing classes volunteered to take part in the study. She has nearly a decade of expertise teaching kids how to write academically. She was chosen as the instructor for both groups of learners. Her teaching methods for both groups were similar except for the composing stage (see Fig. 3), where the experimental group's students composed an essay collaboratively. This was to make sure that the conditions of the training were not different except for the activities for collaborative writing. In other words, in case there was an influence on the students' writing outcomes, it could be an effect of collaborative writing as an indicator. The researcher performed pre-tests on both groups before training to confirm that their writing talents were equivalent. As demonstrated in Table 1, there was no statistically significant difference between the two groups.

Prior to the current study, both groups of students received training in how to compose academic paragraphs and essays through their mandatory enrollment in Writing 1, 2 & 3 courses. "Academic Writing Skills—Student's Book 3" by Chin et al. (2013) was used to instruct students in this course.

The researcher and lecturer discussed in detail each of the two groups' teaching strategies and activities. All classes were divided into smaller groups of three or four students to cooperate with each other on tasks. It was recommended that the instructor approach all groups equally and carefully. The majority of the teaching and learning work between the two groups was comparable, except for the essay writing stage. The control group autonomously wrote essays while the experimental group cooperated. Throughout the procedure session, further clarification was offered.

Table 1 Students' writing quality before the treatment

Variable	*M*	*SD*	*t*	*df*	*p*
The writing quality of the pre-tests					
Control group	5.977	1.274	.084	60	.933
Experimental group	5.954	.917			

The *t* and *df* were not adjusted because variances were equal

Independent Samples t-test

Research Design

The present investigation utilized a pre-test and post-test design. Pre-test and post-test designs are prevalent in educational research and are ideally suited for examining the effects of treatment (Dugard & Todman, 1995). Pre-test post-test designs, according to Dimitrov and Rumrill (2003), entailed comparing groups and quantifying change using pre-test and post-test data. One of the two most frequent methods of data analysis was a two-sample t-test on the difference between pre- and post-test scores (Brogan & Kutner, 1980). This study used quantitative analysis to analyze and compare students' pre- vs. post-tests of the written papers. Figure 2 presents the research design as follows:

Procedures

Prior to the formal training, the researcher met with the lecturer who would be training the two classes/groups to discuss the goal of the study and the training techniques that would be used to train the two groups on argumentative essays using collaborative learning activities. One week before the beginning of the semester, the researcher and the lecturer confirmed and discussed the majority of work used to instruct the students of both courses. As a result, all possible writing topics for pre-and post-tests were discussed and modified to ensure that they were comparable in complexity and acceptable for students' competency levels. For example, all of the pre-and post-test writing topics related to the subjects of their studies. This was done to ensure that every student had an opportunity to brainstorm ideas for their work. Additionally, the writing assignments (tests) were argumentative in nature, and students were needed to articulate their position on their arguments. Moreover, in the course of the training, the researchers often met the teacher at the university's canteen during their breaks to discuss problems or other important duties to ensure that everything worked well. In other words, the meetings' purpose was to verify that each training phase was manageable to avoid any unexpected changes.

On the first day of the class meeting, the control group and experimental group were informed that they were selected as samples for the research. If any students did not volunteer to participate in the study, they were still treated as normal students, but their data was not used for the research. Other participants were told that their data was confidential

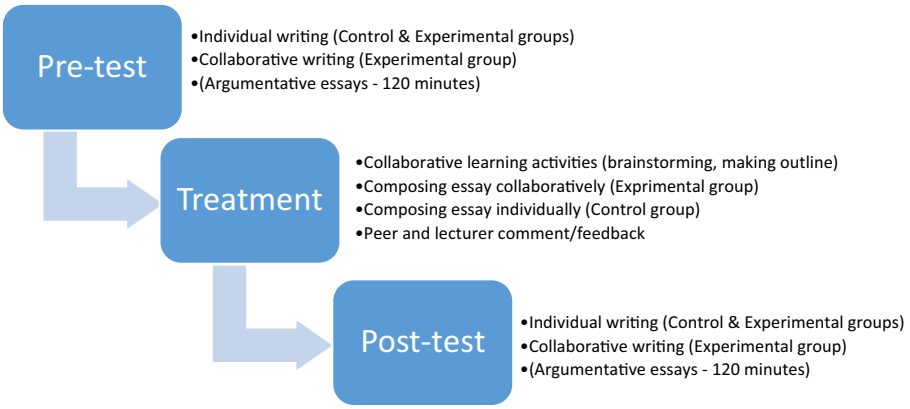

Fig. 2 Research design

Topic selection	• Brainstorming for a general outline
Teacher's comments	• Commenting for selection of main ideas
Detailed outline	• Revising and developing a detailed outline
Peer and teacher's comments	• Commenting on the detailed outline
Collaborative writing/Individual writing	• Using the detailed outline to compose an essay
Peer's comments	• Commenting on the first draft
Revision	• Revising for the second draft based on peers' comments
Teacher's comments	• Commenting on the second draft
Revision for evaluation	• Revising for the third draft for evaluation

Fig. 3 Framework for training procedures

for the purpose of the research only. Additionally, the study's objective was explicitly described to each group of students, ensuring they understood their role in the academic writing process. Then, for the pre-test, each group was assigned a topic for an argumentative essay. On the second day of class, the students in the experimental group collaborated to write another argumentative essay. Collaborative writing in this paper referred to the product that four students in a group composed an argumentative essay together and shared authorship. The allocated time for each writing was 120-min long.

Students in two groups produced four separate pieces of writing throughout the course: one for the pre-test, two for the training as a whole, and one for the post-test. In contrast to the control group, the experimental group was allocated to produce two additional written articles for pre and post-test study reasons for this investigation.

The training procedures or writing activities employed for the two groups were mostly the same, except for the stage of writing products. All activities provided for the two groups were based on an approach centered on the writing process. Both sets of students were required to work in groups of three or four. They collaborated to explore writing subject ideas, generate concepts, and create an outline. According to Pham (2021), the brainstorming activities employed in the writing classrooms at this faculty of foreign languages were typical activities that the students of the two groups had used in their previous writing courses (writing-1, 2 & 3). In other words, the students in the current study got used to conducting these kinds of activities to brainstorm ideas and make an outline for their writing. The composition stage was the only distinction between the two groups. The control group created the essays alone after collaborating on all prewriting tasks, whereas the experimental group collaborated. That was, the group members wrote together one essay for each topic. As observed by the lecturer, during the composing stage, the experimental group members divided each paragraph for each member to compose based on the outline they had made together. Then, the group members put all paragraphs together for the argumentative essay. After that, they all read together, discussed, and provided feedback to make their own collaborative essay better. This writing activity was conducted on paper in the classroom.

After the composing stage, the peer and lecturer feedback/comment activities were applied to the two groups in the same ways. All written papers were completed in class using the students' handwriting styles. This was done to ensure that students did their writing activities under the lecturer's supervision. Each writing project was allotted 120 min. No limit on the length of the essay was employed. The purpose was to provide students with spaces to show their creativity in the genre of argumentative essays to convince the readers. Figure 3 presents the framework for the training procedures of the control and

experimental groups. Most of the activities were the same for both groups, except for the stage of composing. While the control group conducted individual writing, the experimental group employed collaborative writing.

Inter-Raters

In order to ensure validity and reliability, two staff lecturers who had a good experience in teaching academic writing to the faculty of foreign languages of the university participated in the study as raters. One lectured both control and experimental groups, while the other graded separately. All papers written by students were photocopied and distributed to the two raters. The raters were provided with an analytic scoring rubric that had been piloted twice with students who shared similar features to the current study's sample. This scoring rubric was also used to score the students' argumentative essays at the faculty of foreign languages. The pre-test papers were sent to the two raters right after the lecturer collected them before the training, and the rating scores lasted for two weeks. After the training and post-tests were administered to the students, they were forwarded to the two raters for evaluation. After receiving the grading scores for the two raters, the average scores will be computed. In case there was a 1-point or larger than a 1-point discrepancy, the third rater/researcher was employed to provide grades. Then, the closest result of one of the two raters was averaged by the third rater. Cronbach's Alpha for (1) pre-test group inter-raters was 0.981, (2) post-test was 0.904; (3) collaborative written experimental group pre-test was 0.867; (4) collaborative written post-tests 0.970; (5) individual written pre-tests was 0.862; and (6) individual written post-test was 0.904.

Data Collection and Analysis

Even before and after the control group, pre and post-tests by an experimental group, and collaborative pre- and post-test papers by an experimental group, all the students' written documents were collected. Additionally, data analysis included comparisons of students' pre-and post-test results, as well as inter-rater grading rubrics. To address the two research issues, the SPSS vs. 22 program was used to assess all students' and inter-raters' scores.

Results and Findings

To answer the study's research questions, 144 written papers from students were gathered. From these 144 articles, 54 papers were gathered, including 27 from the control group's pre- and post-test periods. 35 individual and ten collaborative writing papers from the pre-test and 35 individual and ten collaborative writing papers from the post-test were gathered from the experimental group. The written papers of the students were rated by two independent raters, one of whom was the lecturer of the two courses and the other of whom was not engaged in the study project. If the difference between the two raters was less than 1 point out of 10, it was averaged. If the difference was more than one point, the third rater's score would be averaged with the closest score between the other two. The pre-test

correlation for the control group was 0.981, whereas the correlation for the experimental group was 0.862.

Before addressing the present study's difficulties, the quality of writing of students in both control and experimental groups was tested to ensure there were no statistically significant disparities in the quality of writing in both groups. The study was based on the research's criteria of writing quality. In the control group, 27 written papers were compared to 35 individual writing papers inside the experimental group by the SPSS versus 22. The independent t-test was employed to evaluate if statistically significant differences existed. The following table shows how the two groups of students write before they receive treatment.

Table 1 demonstrates the differences in the quality of writing among students during pre-treatment assessments between the control and experimental groups. The hypothesis was that among students, there was no statistically significant change in the quality of the writing. As can be found, the independent t-test sample was utilized to compare the 27 written documents of the control group to the 35 written pieces of the experimental group. Each paper in the control group contained an average of 391 words (M = 390.77; SD = 130.77), while each article in the experimental group contained an average of 359 words (M = 358.71; SD = 73.48). The mean score was 5.98, while the experimental group had a mean score of 5.95. The p value of.93 (t(60)-08; $p = 0.93$; $p > 0.05$) showed that the control-experimental groups were statistically unlikely to differ significantly. Nobody dismissed this null hypothesis. In other words, prior to the study's treatment, the writing quality of students in both groups was comparable. If there was a change in the students' writing outcomes following the training, this would serve as a predictor of the treatment's effect on the students' writing quality.

Research question 1 Do collaborative writing activities have any effects on individual writing outcomes?

In addressing this research question, I compared (1) the average scores of pre-and post-test control groups and (2) the mean scores of the written paper of the experimental groups, which determines the results of writing after collaborative writing during the course are different. (3) The mean post-test findings of both groups were then compared. Cronbach's Alpha was 0.903, while that of the experimental group was 0.904 for the post-test group. The pre-and post-test findings of the control group are shown in Table 2.

Table 2 shows a comparison of the writing quality of the control group between the pre-and post-tests. As shown, the mean post-test score for the control group was higher than that for the pre-test group (M = 6.39; SD = 1.09) (M = 5.98; SD = 1.27). The default deviation was −0.42 on average. But the p-value was 0.15(t(26) = −1.49; $p = 0.15$; $p > 0.05$), showing that the pre- or post-test results of the control group had no statistically significant difference. We may conclude that the control group's students' writing quality did not improve significantly following the course's careful instruction, while the majority of the training activities were conducted with great care. In other words, effectively educating students to produce argumentative essays on their own was difficult. The pre-and post-test results for each paper written by the experimental group are compared in Table 3. For pre-test and post-test, Cronbach's Alpha was 0.862 and 0.904.

As described earlier in the method session, In the pre-and post-tests, the experimental group's students completed two distinct writing assignments. The first paper was authored independently, while the second was collaboratively written. Individual writing papers were compared between pre- and post-tests in Table 3. The mean post-test score for 35 individually produced papers from the experimental groups was 6.51 (M = 6.51; SD = 1.07), compared to 5.95 (M = 5.95; SD = 0.92) for the 35 pre-test articles. −0.56

Table 2 Comparison of students' writing quality between the pre- vs. post-tests of the control group

Variable	M	SD	Correlation	Mean difference	*t*	*df*	*p*
Writing quality							
Pre−test of the control group	5.98	1.27	.26	−.42	−1.49	26	.15
Post-test of the control group	6.39	1.10					

Paired Samples t-test

was the mean deviation. There was a smaller mean difference between the experimental and control groups (−0.56 vs. −0.42). Compared to the control group, there were statistically significant differences between the pre-and post-tests in the Paired-sample-t-test result of 0.01 ($t(34) = -2.82$, $p = 0.01$; $p = .05$). This means that each student in the experimental group increased his ability to write because he participated during the semester in collaborative writing.

Table 4 shows the post-test comparison between the control and experimental groups of the writing qualities of the students.

Table 4 compares the post-test results of the control and experimental groups. The experimental group's mean score ($M = 6.39$; $SD = 1.09$) was compared to the control group's mean score ($M = 6.51$; $SD = 1.07$). The average discrepancy was 0.12. Despite the fact that the experimental group's mean post-test score looked to be higher than the control group's, the independent t-test sample indicated that the quality of writing did not differ substantially between the two groups ($t(60) = 0.42$; $p = 0.67$; $p > 0.05$). The subsequent part contains answers to the second research question.

Research question 2 Is there any difference in writing quality between students' collaboratively written papers and individually written papers?

To address the second research question, we compared 35 individually written articles to ten collaboratively authored articles (10 smaller groups) from the experimental group's pre-tests to determine a difference. Each subgroup in the experimental group consisted of three or four students. Then 35 individually written papers of the post-test were compared to those of 10 collaboratively written papers. The purpose was to reconfirm previous research about the effectiveness of collaborative writing. Cronbach's Alpha was 0.867 for the pre-test collaborative written paper and 0.862 for the individual written paper. Table 5 summarizes the findings of the experimental group's pre-tests comparing the quality of individual vs. collaborative writing.

Table 3 Individual writing of the pre-test vs. individual writing of the post-test of the experimental group

Variable	M	SD	Correlation	Mean difference	*t*	*df*	*p*
Writing quality							
Individual writing of the pre-test	5.95	.92	.32	−.56	−2.82	34	.008
Individual writing of the post-test	6.51	1.07					

Paired Samples t-test

Table 4 Comparison of the writing quality of the post-tests of the two groups

Variable	M	SD	*t*	*df*	*p*
The writing quality of the post-tests					
Post-test of the control group	6.39	1.09	.42	60	.67
Post-test of the experimental group	6.51	1.07			

The *t* and *df* were not adjusted because the variances were equal

Independent Samples t-test

The comparison of individual vs. collaborative writing in the experimental groups' pre-test is summarized in Table 5. As can be seen, the mean score for 35 articles published separately was 5.95 (M = 5.95; SD = 0.92), whereas the mean score for 10 papers produced in collaboration was 6.71 (M = 6.71; SD = 0.64). The average deviation was -0.75. The correlation between independently written papers and papers written in collaboration was.44 (r = 0.44). During the pre-tests, high-scoring jointly produced papers were frequently accompanied by high-scoring independently authored papers (44%), and vice versa. A significant difference between the individually and collectively prepared pre-test papers (t(34) = −5.20, $p = 0.00$, $p = .05$) was seen in the matched sample. In other words, the quality of collaboratively written papers (each group included 3 or 4 students) was much better than that of the individual papers.

In order to confirm the effectiveness of collaboratively written papers, 35 individually written papers were compared to 10 collaboratively written papers in the post-tests. Cronbach's Alpha for the inter-raters of the collaboratively written papers of the post-test was 0.970; individually written papers were 0.904. Table 6 compares the individual vs. jointly produced post-test papers for the experimental group.

The T-test Paired Sample was used to compare the individually vs. collaboratively written papers in the experimental group's post-test. The mean score of the individually written papers was 6.51 (M = 6.51; SD = 1.08), and that of the collaboratively written papers was 7.24 (M = 7.24; SD = 1.00). The mean difference was −0.73, which seemed to be smaller than that of the pre-test (−0.73 vs. −0.75). The average score for collaborative writing was higher than the average score for solitary writing (7.24 vs. 6.51). The difference between individual and co-authored written papers was statistically significant (t(34) = −3, $p = 0.005$, p.05). The writing quality of the collaboratively written papers far outweighed the individually written papers. We concluded that the jointly authored essays had much higher writing quality than the experimental group's independently produced articles.

Table 5 Comparison between individual writing vs. collaborative writing of the pre-tests

Variable	M	SD	Correlation	Mean difference	*t*	*df*	*p*
Students' writing quality in the pre-tests							
Individual writing	5.95	0.92	0.44	−0.75	−5.2	34	.00
Collaborative writing	6.71	0.64					

Paired Samples t-test

Discussion

The first question of the study replied that (a) the findings of the pre-tests of both groups (Table 1) had no statistical difference, while (b) no statistical difference existed between before and after the tests of the control group (Table 2). However, (c) the paired t-test sample showed a statistically significant difference compared to the pre-and post-test group. When they individually wrote in the post-tests compared to the pre-tests, the results of the experimental group were improved. However, (d) the statistical differences in post-test results between the two groups are not statistically significant. The absence of a statistically significant difference between the post-test values of both groups may show that the training procedures have been treated equally in both groups. No priority was given to either one of the two. Most of the activities for training procedures were similar except for the final stage of writing a product. One group composed their writing individually (control group) and the other collaboratively (experimental group). Table 3 demonstrates that the collaborative writing activities used in the experimental group had a significant impact on each student's writing production. This conclusion corroborated Sutherland and Keith's (1999), Biria and Jafari's (2013), Shehadeh's (2011), Aminloo's (2013), and Storch's (2005) findings showing students' writing quality significantly increased after engaging in collaborative writing activities. This suggested that collaborative writing activities had a significant impact on the writing outputs of students. This was one of the hypotheses of the current study, and its hypothesis was rejected. This result had great value when employing collaborative writing activities in the writing classrooms due to the fact that in case collaborative written products were good but individually written papers were not, it did not make sense to apply in the training procedures.

Previous research studies, such as Biria and Jafari (2013), Storch (2005), Zabihi and Rezazadeh (2013), Sutherland and Keith (1999), Shehadeh (2011), and McDonough et al. (2018), confirmed that collaborative writing activities helped students in groups produce superior writing texts compared to individual writing papers, while also improving each student's writing skills. Additionally, Aminloo (2013) discovered that both groups greatly improved the outcomes of their writing papers. In terms of the benefits of collaborative learning, Dobao and Blum (2013) and Watanabe and Swain (2007) state that students earned higher grades in writing papers due to their English proficiency being distinct from that of group members owing to discussion activities.

However, not all researchers found effectiveness in collaborative writing activities. Kim (2008) found no improvement in writing outcomes among students even if they committed to the individual or collaborative writing activities in his/her research study. The only vocabulary was found better for use in collaborative writing products. Similarly, Zhang (2018) did not find any differences in students' writing products in accuracy and text quality after applying a collaborative approach in training. This indicated that collaborative

Table 6 Comparison between individual writing vs. collaborative writing of the post-tests

Variable	M	SD	Correlation	Mean difference	*t*	*df*	*p*
Students' writing quality of the post-tests							
Individual writing	6.51	1.08	.05	−.73	−3	34	.005
Collaborative writing	7.24	1.00					

Paired Samples t-test

writing activities should be with greater care to help students in the writing process. The current study's design took great care of each collaborative learning activity, from the stage of topic selection and brainstorming activities to peer feedback activities and the roles of the lecturer and student writers (See Figs. 2 & 3). Therefore, the results of the current students seemed to be positive. That is to say, The lecturer's care was required to ensure the effectiveness of the collaborative writing exercises.

In response to research question 2, the current study's findings indicate that the quality of jointly authored papers was much higher than the quality of individually written articles. This was not difficult to recognize because four students working together could be much better than only one student who produced a written paper. This finding bolstered Dobao's (2012) results, which found that four students' products of co-authored papers were much better than those of individuals and pair-written papers. Shehadeh (2011) also found that co-authored essays gained better quality compared to those of individually written papers in terms of content and organization. Similarly, Storch (2005) claimed that collaboratively written papers had better sentence structures, more accurate vocabulary uses, and more explicit purpose of writing. Sutherland and Keith (1999) argued that collectively authored articles were significantly superior to those produced alone.

However, if only jointly authored papers were superior to those produced independently, the benefit of research for this writing technique was little when collaborative writing activities had little effect on students' individual writing outputs. In comparison to previous studies (Biria & Jafari, 2013; Shehadeh, 2011; Storch, 2005) that compared collaboratively written papers to individually written papers, the findings of the present study (answers to the first research question) filled in the gaps and provided an original contribution to the body of knowledge.

Conclusion

The current study found that collaborative writing activities substantially affected students' writing outcomes to close gaps in past studies. Students' written papers, both collaborative and individual, improved significantly. The experimental group's post-test writing scores exceeded their pre-test scores. In other words, the student's writing quality is remarkably enhanced after committing to collaborative writing activities during the course. This was the core value of the current study to fill in the gaps in the body of knowledge (Shehadeh, 2011; Storch, 2005; Zabihi & Rezazadeh, 2013; và Biria & Jafari, 2013). This had good implications for those lecturers who often had big-size writing classes (from 40 to 50 students per class). They could apply this writing approach to their writing classrooms to reduce their working load for peer feedback or scoring activities.

Additionally, the current study's findings validated the efficacy of collectively authored goods compared to individually prepared articles. This finding was established by previous studies such as Biria and Jafari (2013), Dobao (2012), Shehadeh (2011), Storch (2005), and Sutherland and Keith (1999), which discovered that collaboratively written papers were significantly higher in quality than individually written papers in both pre-and post-tests. The current study's findings indicated that collaborative writing was effective prior to any therapy (during the pre-test). This conclusion bolstered the study's validity and reinforced the conclusions from the first research question.

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