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# The Influence of Computer-based and Collaborative Handwritten Peer Feedback on the Writing Performance of EFL Learners

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## Abstract

The present study investigated the accuracy of writing, amount of feedback and comment category (global and local comments) of twenty-eight intermediate EFL students providing peer-peer feedback on writing in a computer-based and collaborative handwritten based format. Following administration of a proficiency test, the participants wrote a composition on a topic for the pretest, completed three writing tasks, and wrote on the same topic for the posttest (as in the pretest). During the treatment sessions, students in the computer-based group provided peer-peer feedback using word processor tools and the students in the handwritten group provided collaborative handwritten peer feedback to each other. The results indicated that the accuracy of the collaborative handwritten group significantly improved from pretest to posttest; however, no significant difference was found in the writing accuracy between the two groups. The qualitative analyses of the data collected during the treatment sessions indicated that the amount of feedback in the collaborative handwritten group was considerably higher than that of the computer-based group. Moreover, considering the comment category, it was revealed that the students of both groups predominantly focused on providing local comments. It can be concluded that applying collaborative handwritten peer feedback might be beneficial in providing more elaborated feedback, conducive to L2 writing development.

***Keywords:*** Collaborative Dialogue, Computer-based Feedback, Global/Local Comment, Peer-Peer Feedback

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## 1. Introduction

Over the past two decades, peer-peer feedback and collaborative writing have attracted considerable attention in the field of second language acquisition (SLA) research and pedagogy. The engagement of English language learners in collaborative dialogue and feedback delivery through computer-based tools has also been the subject of numerous studies (e.g., Bikowski & Boggs, 2012; Li & Cumming, 2001; Storch, 2005, 2011, 2013; Wolfe, et al., 1996). Learners can be considered as a source of information for each other assuming responsibilities that is normally undertaken by language instructors or editors in making comments and criticizing learners' drafts (Liu & Hansen, 2002). In collaborative writing, the role of conversation and consultation has been emphasized by the advocates of collaborative dialogue, considering writing as a socio-contextual phenomenon (Ajideh, Leitner & Yazdi-Amirkhiz, 2016). During the various stages of writing, using peer-peer feedback activities enables learners to diagnose their strengths and weaknesses (Zeqiri, 2011). Peer-peer feedback activities have mutual learning benefits in which both writers and reviewers can improve their writing skills when they observe their classmates' writing production and feedback (Abadikhah & Yasami, 2014). Peer-peer feedback can be provided during dialogic interaction of learners when providing handwritten feedback on paper or by using technological tools such as computer-based processors.

Previous studies have investigated the impact of traditional handwritten peer feedback on L2 writing (Kamimura, 2006; Sotoudehnama & Pilehvari, 2016; Wakabayashi, 2008); other scholars have considered the effectiveness of the computer-based peer feedback on EFL learners' writing quality (AbuSeileek, 2006; Kessler, Bikowski & Boggs, 2012; Li & Cumming, 2001; Wolfe, et al., 1996). To sum up, several comparative studies of computer-based and handwritten peer feedback were carried out to find out which method would be more beneficial in improving the writing skill (Lee, 2004; Li & Cummin, 2001; Mohammadi, Gorjian, &Alipour, 2012). Consequently, many of them supported the positive role of computer-based peer feedback in improving EFL learners' writing skill since the participants in the computer-based group outperformed the traditional handwritten group. However, studies by Collier and Werier (1995) and Wolfe, et al., (1996) indicated no effect for the medium of feedback delivery involving computer-based and handwritten-based feedback. In these studies, while peer reviewers in the computer-based group were able to receive automatic feedback from the word processor tools, peer reviewers of the handwritten group did not have access to any mediational tools, such as computers or dialogic interaction as occurs during collaboration. Although the effects of computer-based peer

feedback and handwritten peer feedback on L2 writing quality have been widely examined, no systematic attempt has been made to explore the effective role of collaborative dialogue as a meditational tool in providing handwritten peer feedback. Thus, the present study intends to examine how computer-based student feedback would compare to collaborative handwritten feedback in improving EFL students' writing performance and feedback provision in terms of comment category and frequency. The study, therefore, attempts to answer the following research questions:

1. Is there any significant difference in the writing accuracy of EFL students who received computer-based peer feedback and those who received collaborative handwritten peer feedback?
2. What are the effects of computer-based and collaborative handwritten peer feedback on the amount of peer feedback?
3. What are the effects of word processor-based and collaborative handwritten peer feedback on the comment category (global and local) of peer feedback?

## 2. Literature Review

### 2.1. Providing Feedback in Writing

Feedback in writing relates to the input provided by the reader based on which the writer revises the text (Keh, 1990). Three main sources of feedback include teacher feedback, peer feedback, and computer-assisted feedback. In classroom context, teachers are often the main providers of feedback; in fact, one of the main tasks of English writing teachers is to provide effective written feedback (Hyland & Hyland, 2001). Provision of feedback, however, might be particularly challenging for EFL teachers, who are predominantly engaged in correcting and commenting on the students' compositions; more frequently, they are unable to provide feedback to all students due to the time limitation.One possible way to enhance feedback provision in the learning process is through collaborative peer-peer feedback (Suwantarathip &Wichadee, 2014). One of the main assumptions regarding peer-peer feedback is that it can improve language learning (Hyland & Hyland, 2006). It has been maintained that peer review feedback enhances the critical thinking skills of learners enabling them to analyze and revise their own writing (Leki, 1990), increases the active participation of learners (Mendonça & Johnson, 1994), and provides an authentic learning environment (Hyland, 2003). In peer feedback activities, learners have the opportunity to receive scaffolded support (Guerrero &Villamil, 2000) and to get experience in recognizing linguistic errors, which may encourage them to read and self-correct their own writings before their instructor or peer does (Bitchener& Ferris, 2012).

Peer-peer feedback has been supported by sociocultural theory of mind stating that peer-peer interaction makes meaning within the framework of dialogic interaction and leads to both cognitive and social development of learners (Zhang, 1995). Feedback practices can be viewed as a means of developing the writing skill; therefore, its absence in the writing classroom makes writing as an individualistic task, in which learners would not have the opportunity to express their messages to their readers and take advantage of mutual work and co-construction of knowledge (Park, 2015). According to Vygotsky (1978), learning occurs when there is a social mediation which can be in the form of teaching and learning aids. One of the effective meditational tools in learning emphasized by many SLA scholars is *collaborative dialogue*. Swain and Lapkin (2002) defined collaborative dialogue "as an externalization of thoughts which can be scrutinized, questioned, reflected upon, disagreed with, changed, or disregarded" (p.286). Swain (2006) believed that language can be used as a cognitive tool to make and shape meaning (Swain, 2006) and mediate understanding (Yeh, 2014). Adopting this theoretical perspective, Storch (2005) maintained that although the essays written by pairs of learners were shorter than those produced individually, they were superior in terms of accuracy and complexity of grammatical features. Likewise, Park (2015), adopting a sociocultural view, mentioned that collaborative tasks result in more collaborative dialogue, which enhance the learning situations. He claimed that "there can be a positive relationship between the amount of language-related episodes (LRE) and the quality of a written product"; in other words, "more LREs could mean better written products in collaborative tasks" (Park, 2015, p.131).

Another mediational tool to increase the learning opportunity in the writing classrooms is to exploit the computer-based tools in providing peer feedback. In the writing courses, learners can use word processor tools for such applications as inserting, deleting, cutting, pasting and editing words (Brierley & Kemble, 1991). After activating the tools, learners would receive automatic feedback which enables them to write easier and produce a more different and effective text (Pennington, 1996). When automated electronic feedback is used, learners provide comments much faster due to the speed of the computer-based feedback provision (Warschauer, 1996). Using computer-assisted feedback, instructors would be able to make maximum benefit of the class time and focus on other aspects of teaching in the writing process. Besides, when learners provide computer-based peer feedback, they focus on local feedback rather than the global one (Schultz, 2000); which is more beneficial for them at the beginning stages of learning the writing skill. On the other hand, applying the computer-based peer feedback can also be effective for advanced learners. As Etchison (1989, p.23) suggested, the computer-based tools can be used to enhance useful writing habits such as

revision of not only surface features but also deeper levels of meaning and content.

## 2.2 Computer-based and Collaborative Handwritten Peer Feedback

In the L2 literature, there are two lines of research concerning the effectiveness of the computer-based tools on writing achievement of the learners (Pennington, 2003). While computer-based tools had a positive effect on quality and content of writing in some studies (AbuSeileek & Abualshar, 2014; Mohammadi, et al., 2012), it had no effect in others (Collier & Werier, 1995; Wolfe *et al.,* 1996). The inconsistency in results was observed in writing processes including planning and revising by both experienced and inexperienced writers (Lee, 2004). According to the concern of the first line, applying computer-based tools would improve L2 writing. One such survey revealing the positive effect of peer feedback on writing classroom was conducted by AbuSeileek (2006). The study was carried out with 85 freshmen English major students to examine the use of word processors for teaching writing. Based on the results, he found that computer-based feedback facilitated the learners' workload, created a self-learning environment, and enabled them to notice and correct their errors. Similarly Mohammadi, et al. (2012) found that utilizing word processors in their writing courses produced high quality writing similar to a professional publication.

However, the second line of the research indicated that using word processors had no effect on the writing product of the learners. For example, Collier and Werier (1995) discovered that professional computer writers composed similarly in handwritten letters despite the fact that paper writing caused more discomfort. Likewise, in their survey, Wolfe *et al.* (1996) illustrated that learners with a high to medium computer experience did the same in both word processor-based and handwritten composition and were not affected by the writing medium.

On the other hand, few studies have indicated the positive role of collaborative handwritten feedback in second language writing (Park, 2015; Yeh, 2014). In order to examine how collaborative dialogue facilitates collaborative writing, Yeh (2014) conducted a study on 54 non-English major students at a university in central Taiwan. The findings revealed that collaborative writing led to the production of high quality essays in terms of accuracy and fluency. He suggested that more opportunities for collaborative dialogue should be provided during the writing process including such stages as message generation, writing reply essays and editing process (Yeh, 2014). Park (2015) also investigated the effectiveness of collaborative writing in EFL classrooms for low proficiency learners. The results indicated that low proficiency EFL learners significantly enhanced their fluency, accuracy and complexity in writing.

Shaqaqi and Soleimani (2018) explored the effect of written corrective feedback (metalinguistic) in different settings (conventional and asynchronous). The researchers examined whether metalinguistic feedback would be more effective in computer-based or handwritten environment. They explained that metalinguistic feedback, defined as written corrective feedback related to the linguistic explanation about the errors (Ellis, 2009) can be exploited as an effective mediation in the development of L2 writing. As they illustrated, metalinguistic feedback provides opportunities for learners to diagnose their errors and in fact, "it can scaffold L2 learners to notice the gap between their knowledge and the received metalinguistic feedback" (p. 58). The researchers concluded that asynchronous metalinguistic feedback improved both computer-based and handwritten accuracy; however, it was more significant on the computer-based group.

While some studies have supported the positive effect of handwritten feedback on developing L2 writing (Kamimura, 2006; Min, 2006; Ting & Qian, 2010; Wakabayashi, 2008), more recent studies have indicated the beneficial role of computer-based feedback in improving the writing skill of EFL learners (AbuSeileek, 2006, AbuSeileek & Abualshar, 2014; Brierley & Kemble, 1991; Li & Cumming, 2001; Mohammadi, et al., 2012). Nonetheless, there seems to be a paucity of research to compare the computer-based peer feedback with collaborative handwritten peer feedback to investigate which method would be more effective in L2 writing. The current study is an attempt to fill this gap by exploring the comparative features and effects of applying the computer-based feedback and collaborative handwritten feedback provided by pairs of learners in improving the writing skill of L2 learners.

## 3. Method

### 3.1. Participants

The current study was conducted with 28 intermediate EFL students majoring in English literature at a state university located at the state university of Mazandaran. Following Dornyei (2007), , the students were chosen based on convenience sampling from an intact class on English Grammar and Writing (II), meeting twice a week (each session for approximately 90 minutes). According to Cohen et al., (2000), this type of sampling involves choosing the nearest individuals who are easily accessible to the researcher. The participants were randomly assigned into the two homogeneous groups of computer-based and collaborative handwritten, each one including 14 students (7 pairs). The participants had already passed the course of English Grammar and Writing (I) during the previous semester and so had firm understanding of formal terms and rules of English grammar and

writing. Yet, the computer-based group was informed that they would be introduced and exposed to a new approach of feedback delivery in writing, using word processors. Moreover, some other issues such as grouping, class participation, writers' roles and reviewers' roles were explained in detail.

## 3.2. Materials and Instruments

Sources of the data for the current study included a proficiency test, handwritten texts on the treatment sessions, pretest and posttest accuracy rate for each student and written comments (or feedback) of the peers in the treatment sessions.

### *3.2.1. Proficiency Test*

A TOEFL test adopted from Educational Testing Service (TOEFL Practice Test, Volume 1, 2003) was administered to ensure the homogeneity of the students in the two groups. Using t-test formula, the p value was estimated to be 0.682 which is above the set significance level (<0.05). The result indicated that the participants in the two groups were at the intermediate level and did not differ significantly in terms of English language proficiency level.

### *3.2.2. Writing Tasks*

The rationale for using students' written texts in this study was twofold. First, in order to find out whether the treatments (computer-based and collaborative handwritten peer feedback) given to the two groups were beneficial or not, two writing tasks were employed as the pretest and posttest of the study. The topics for these tests and the three topics for treatment sessions were all adopted from Practice tests for IELTS 1 (Jakeman& McDowell, 2003). Second, the purpose of implementing the writing tasks was to compare the amount of feedback provided by the students through the medium of computer or handwriting and the nature of comments during the treatment sessions. Therefore, the participants of this study were engaged in three different writing cycles in the treatment sessions. For each cycle, one topic was selected. The genre of their essays was argumentative.

### *3.2.3. Computer-based Tools*

The use of computer programs serves the aim of both assistance and autonomy in the writing process (Williams, 2005). One of the computer-based tools is *track changes* command, which is on the review command of the word processor toolbar. After activating this tool, students were able to select and delete errors, which were automatically crossed out by a red line. *New comment* is another tool of the word processor used in the present study, which is on the review section of the toolbar. When using comment in their peer review feedback, students, first, chose the erroneous section and provided their comments on it by typewriting their feedback comments. In

this case, a red box would appear horizontally on the right hand side of the screen with the comments of the students. Under the review command, there is another tool called *spelling and grammar*; by activating this command, the errors were automatically selected and their correct forms were suggested. Therefore, students were able to select the correct form of the word or ignore it by choosing the ignore section. Finally, *Dictionary* was also utilized as another word processor tool in this study. By activating this tool, the participants were suggested the related vocabulary and synonyms for the selected words.

### 3.3. Procedure

In order to achieve the purpose of the study and involve two homogenous groups, the researchers administered a TOEFL proficiency test (TOEFL Practice Tests, Volume 1, 2003) to a group of EFL students who were attending their second semester at the university of Mazandaran. After administration of the test, the participants (N=28) were assigned into two homogeneous groups of computer-based and collaborative handwritten with 14 students in each group. Then, a pretest was administered to determine their writing accuracy. In the pretest session, the participants in both groups were given a writing task to be completed in class within 30 minutes. After the administration of the pretest, the students in each group were asked to self-select their partners (7 pairs in each group). Next, the researchers trained both groups by first distributing a worksheet containing editing symbols and example sentences (Olsher, 1995). The students were asked to provide peer-peer feedback after writing their compositions. During the training session, the computer-based group was trained on how to provide feedback on writing by word-processor tools in the computer laboratory. After explaining about how to apply the word processor tools (track changes, comment, spelling and grammar change and dictionary) in giving feedback, the students were asked to practice working with these tools by themselves and check whether they became familiar with their application. Following that, as the first treatment session started, students were given a topic to write a paragraph of 200 words in thirty minutes. After the class, one of the researchers (first author) typed the compositions of the computer-based group and transferred the MS word files to the 14 desktop computers to be used by the participants. While the students in the computer-based group individually provided peer review feedback on a computer for each other, the seven pairs in the collaborative handwritten group worked collaboratively to provide feedback in the classroom. The same procedure was repeated in the following two treatment sessions. On the next session, both groups were required to write on the same topic as in the pretest so that it could be possible to detect any progress in their writing accuracy.

### 3.4. Data Analysis

To conduct the study, a qualitative-quantitative method of coding and data analysis was employed. The coding procedure was qualitative in the sense that the handwritings of the students were analyzed based on the content of what they had written. Therefore, a content analysis was conducted through coding the data in terms of, firstly, error types in the handwritten texts committed by the students and secondly, feedback types in the comments provided by their peers. According to Ellis and Barkhuizen (2005), the two general measures of accuracy are *errors per 100 words* (Mehnert, 1998) and *percentage of error-free clauses* (Foster & Skehan, 1996). The scoring procedure in this study adopted the former measurement, that is, errors per 100 words. It should be mentioned that all errors made in the use of verb tense/aspect, subject-verb agreement, word order, pronouns, plural/singular forms, word formation and spelling were considered. The researchers coded 25% of the data separately. To ensure the reliability, there were discussions and negotiations among the three authors as raters of the texts. The inter-rater reliability analysis for the sample data showed 85% agreement percentage. To compare the rate of accuracy across the groups, SPSS Software version 21 was employed.

## 4. Results and Discussion

### 4.1. Results

The first research question addressed the effects of the treatments on the writing accuracy of the two groups. The statistical analysis involved analyzing the coded data and calculating the accuracy rate for each student, which was computed as the ratio of correct use of the target linguistic features subtracted from the percentage of errors per 100 words. Table 1 presents the descriptive statistics of the pretest and posttest scores of the computer-based and collaborative handwritten groups.

As demonstrated in Table 1, the collaborative handwritten group obtained a lower mean score (85.72) than the computer-based group (87.23) on the pretest. The trend was reversed for the posttest, i.e. the former group obtained a slightly higher mean score (88.24) than the latter one (88.17) on the posttest. Both groups seem to have made improvements from pre-test to post-test. To test the significance of these improvements, two paired samples t-tests were conducted on the pretest and posttest scores of the two groups (Table 2).

Table 1

*Descriptive Statistics of the Pretest & Posttest Scores of the Two Groups*

| Test | N | Mean | SD | Std. Error Mean |
|---|---|---|---|---|
| Pretest Handwritten | 14 | 85.72 | 6.01 | 1.60 |
| Posttest Handwritten | 14 | 88.24 | 4.85 | 1.29 |
| Pretest Computer-Based | 14 | 87.23 | 4.79 | 1.28 |
| Posttest Computer-Based | 14 | 88.17 | 4.87 | 1.30 |

Table 2

*Summary of Paired Samples t-test Analyses of the Two Groups in the Pretest & Posttest*

| Test | Mean Difference | t | df | Sig. (2-tailed) |
|---|---|---|---|---|
| Pretest-Posttest Handwritten | 2.52 | 2.57 | 13 | .023 |
| Pretest-Posttest Computer-Based | .94 | .98 | 13 | .344 |

The result of the paired samples t-tests demonstrated that the writing accuracy of the collaborative handwritten group significantly improved on their posttest session (p=.023).On the other hand, the performance of the computer-based group showed no significant improvement (p=.344) in terms of accuracy from pretest to posttest (p<.05).

To test the significance of the differences across the two groups, it was necessary to conduct two independent samples t-tests on both sets of scores. The result of the tests illustrated in Table 3, however, indicated that there was no significant difference between the pretest (p=.469) and posttest scores (p=.970) of the two groups in terms of accuracy (p<.05).

Table 3

*Independent Samples t-test of the two Groups on the Pretest and Posttest Data*

| Test | T | df | Sig. (2-tailed) |
|---|---|---|---|
| Pretest-Pretest both groups | .734 | 26 | .469 |
| Posttest-Posttest both groups | .038 | 26 | .970 |

To provide an answer for the second research question, the amount of feedback provided by the peers in the treatment sessions was quantified and tabulated. Table 4 presents the distribution of the comments provided by each of the participating groups during the three treatment sessions.

As shown in Table 4, the amount of feedback provided by the collaborative handwritten group increased as treatments continued and reached the total number of 735 (59.03%). On the other hand, in the computer-based group, although the amount of feedback increased in the second treatment, it decreased in the third treatment session. However, there

is a rising trend in the provision of feedback from first to the third session, attaining a total number of 510 (40.96%). By comparing the percentage of these two groups, it can be concluded that the amount of feedback of the collaborative handwritten group was considerably higher than that provided by the computer-based group.

Table 4

*Amount of Feedback in the Treatment Sessions*

| Groups | Treatment 1 | Treatment 1 | Treatment 1 | Total Number | Total (%) |
|---|---|---|---|---|---|
| Handwritten | 206 | 224 | 305 | 735 | 59.03 |
| Computer-based | 139 | 193 | 178 | 510 | 40.96 |
| Total | 345 | 417 | 483 | 1245 | 100 |

To answer the third research question, first, the comments of the students in the two groups were categorized as either global or local. According to Min (2006), global comments include discourse level comments made on idea development and organization of the essays, while local comments constitute minor revisions at sentential level such as punctuation, capitalization, grammar/syntax, spelling and vocabulary. Following this framework, all comments were categorized, quantified, and finally tabulated in separate tables and their percentages were obtained in each treatment session. Table 5 illustrates the amount of global comments in the treatment sessions.

Table 5

*Number and Percentage of the Global Comments in Treatment Sessions*

| Groups | Treatment 1 | Treatment 1 | Treatment 1 | Total Number | Total (%) |
|---|---|---|---|---|---|
| Handwritten | 33 | 87 | 80 | 200 | 72.99 |
| Computer-based | 18 | 46 | 10 | 74 | 27.00 |
| Total | 51 | 133 | 90 | 274 | 100 |

According to the table, most of the global comments were provided by the collaborative handwritten group (Total percent=72.99%). In this group, although the number of global comments increased in the second treatment, it decreased in the third treatment. However, the general trend showed an increase in the global comments from Treatment 1 to Treatment 3 to a total number of 200 (72.99%). On the other hand, in the computer-based group, this process occurred differently. In this group, as the number of global comments increased in the second treatment, it significantly decreased in the third treatment and dropped down to 10 comments. The total number of global comments provided by this group was 74, i.e., 27% of the total comments. By comparing the percentage of the global comments across the two groups, it can be concluded that the collaborative handwrittengroup

provided approximately twice as much global comments as the computer-based group. In other words, the computer-based and collaborative handwritten pairs were different from each other in terms of the number of the global comments. The next table presents the amount of local comments provided by the two groups during the three treatment sessions (Table 6).

Table 6

*Number &Percentage of Local Comments of the two Groups in Treatment Sessions*

| Groups | Treatment 1 | Treatment 1 | Treatment 1 | Total Number | Total (%) |
|---|---|---|---|---|---|
| Handwritten | 173 | 137 | 219 | 529 | 54.87 |
| Computer-based | 117 | 152 | 166 | 435 | 45.12 |
| Total | 290 | 289 | 385 | 964 | 100 |

As illustrated in Table 6, the two groups provided the local comments approximately in a close percentage. In the collaborative handwritten-based group, the total number of local comments was high. Although the number of local comments decreased in the second treatment, it increased significantly in the third treatment and finally, reached a total number of 529 (54.87%). On the other hand, the trend was different in the computer-based group, that is, the number of the local comments increased as the treatments continued. Therefore, in the second and third treatments the local comments dramatically increased and reached a total number of 435 (45.12%). By a close comparison of the percentages of the local comments, it can be concluded that the computer-based and collaborative handwritten feedback seemed to be similar to each other in terms of the frequency of the local comments.

### 4.2. Discussion

The present study was conducted to investigate the effectiveness of computer-based and collaborative handwritten peer feedback in developing writing accuracy. The analysis of data revealed that the accuracy of written compositions of the collaborative handwritten group significantly improved from pretest to posttest. The participants in this group discussed their problems in writing with their peers and provided feedback for each other. This finding is to some extent compatible with the findings reported in previous studies. For instance, Yeh (2014) found that those students who collaboratively wrote produced high quality essays. He observed that collaborative writing improved the writing performance of the students in terms of accuracy and fluency. This result also accords with that of Park (2015), who reported a beneficial effect for collaborative writing inL2. The students' writing significantly improved in terms of accuracy, complexity, and fluency as a result of applying collaborative handwritten peer feedback.

The result of the independent samples t-test comparing the accuracy of writing across the groups, however, indicated that there was no significant difference between the two groups in terms of the writing accuracy. This resultlends support to the findings ofWolfe *et al.*(1996), who found that the learners who had high to medium computer experience did the same in both computer-based and handwritten composition and were not influencedby the writing medium. Likewise, in Collier and Werier's (1995) study, advanced computer writers composed similarly in handwritten letters despite the difficulty involved in paper writing. In the current study, the researchers observed that those students who received computer-based peer feedback underestimated their feedback and considered it as a product created by the mechanical toolsrather than relying on human knowledge. Unfortunately, peers were unwilling to revise their essays based on the received feedback in the subsequent essay writing sessions. Both studies (Wolfe et al, 1996 & Collier & Werier, 1995), however, compared the performance of the same group of learners across the two treatments. To the researchers' knowledge, there has been no study in the literature comparing the performance of two separate groups of students who received computer-based and collaborative handwritten peer feedback.

Contrary to the findings of some studies such asAbuSeileek's (2006) andAbuSeileek and Abualshar (2014), in which students in the computer-based peer review group outperformed their counterparts in the handwritten-based one, in this study, there was no significant difference between the two groups in the posttest. Based on the findings of the previous studies, it was expected that the computer-based group would outperform their counterparts; however, this did not happen in our study. This finding may be due to implementing the collaborative dialogue in the handwritten-based group, which may have facilitated the writing accuracy of these EFL learners. As we observed, many misunderstandings regarding the peer feedback were obviated as writers discussed and explained the structural and semantic features of their essays and the reviewers explained their feedback comments to their peers during collaborative dialogue. In other words, they had the opportunity of mutual scaffolding and receiving feedback written and highlighted in red on their papers. They considered handwritten peer feedback more serious than their counterparts did in the computer-based group since they believed that the feedback comments were based on authentic and real human knowledge not on the mechanical tools. Consequently, they tried to apply their peers' feedback in the subsequent essay writings. Thus, it can be tentatively concluded that applying the collaborative dialogue in the handwritten peer feedback group may have provided more learning opportunities and as a mediational tool may have improved the writing skill of EFL learners. Nonetheless, this needs to be further examined in the future studies.

The analysis of the amount of feedback provided by the two groups indicated that peers in the collaborative handwritten group provided more feedback compared to their counterparts in the computer-based one. To the researchers' knowledge, comparison of the amount of peer feedback between the computer-based and the collaborative handwritten group was not investigated in the literature so far. In the present study, however, one of the aims was to compare the overall amount of feedback between these groups. In the current study, while the computer-based group relied on the word processor tools to provide peer feedback, the collaborative handwritten group interacted with their peers and considered themselves as the only source of feedback provision. These peers may have felt more responsible for peer-reviewing and consequently, provided more feedback.

The current study also compared the computer-based feedback to the collaborative handwritten peer feedback in terms of the comment category (global and local errors). After analysis, it was revealed that in both groups, students focused more on local errors than global errors. This finding brings the results of Ho and Duong (2014) and Ting and Qian (2010) to light, which indicated that most of the comments were on local areas rather than the global areas. However, many studies includingKamimura (2006),Kessler, et al. (2012), Li and Cumming (2001) and Wakabayashi (2008)indicated that the students attended more on meaning than form in their revisions and made higher-level revisions. Similar finding was also reflected in the present study, while the concern of students in both groups was more on local errors; within category comparisons indicated that most of the global comments were provided by the collaborative handwritten peer reviewers. Similar to our study, Schultz (2000) found that the concern of the participants who provided computer-based feedback was more on local feedback, whereas those who made oral feedback were more focused on global changes. As we observed in this study, word processor tools just highlighted the grammatical and spelling errors; therefore, those learners who based their feedback on the word processors might have been prompted to consider just the local aspects of the writings. However, the collaborative handwritten reviewers who had collaborative dialogue to each other, not only made surface level revisions, but also had the opportunity to consider organizational and meaning aspects.

## 5. Conclusion and Implications

The current study aimed to investigate the effect of computer-based as compared to handwritten-based collaborative peer feedback on the development of writing accuracy of EFL learners. It can be tentatively suggested that applying collaborative peer feedback can be beneficial in facilitating feedback provision in writing. As a result of enhanced interaction and scaffolding of peers, learners in our study made significant improvement

in the writing accuracy. Therefore, teachers in similar EFL situations can make maximum use of the class time for efficient editing and feedback provision through collaborative writing. Nonetheless, no generalization can be made about this finding to the larger population due to sampling effects. The current study is, therefore, limited in many respects including small sample size and non-random selection of the participants. These factors together with short duration of the study, not controlling the gender effect, and exposure to other course materials make our conclusions tentative. Thus, further research is required to design proper methods to investigate computer-based and collaborative handwritten peer feedback in the writing process. This line of enquiry could be further extended to other generations of participants involving a larger sample and other proficiency levels of EFL learners, i.e. elementary and advanced learners. Studies of this nature need to investigate the effect of feedback types on the quality of revised essays. Triangulation of the data by evaluating the participants' attitudes and perspectives through interviews and questionnaires, tape-recording their dialogic interaction, analyzing their speech and overall assessment of the writing quality are left for further investigation.

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