**Migration Letters**

Volume: 21, No: S6 (2024), pp. 476-498

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

# The Effect Of Web-Based Pre-Task Activities On Writing Complexity, Accuracy And Fluency Of Iraqi EFL Students

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**Abstract**

*This study was an attempt to examine the effect of web-based pre-task activities on writing complexity, accuracy and fluency of Iraqi EFL students. For this purpose, 60 Iraqi EFL learners from University of Babylon, Iraq were selected from a larger number of EFL students enrolled in the writing course in Fall semester, 2022-2023 based on their performance on the Oxford Qu[1]ick Placement Test and were randomly assigned into three groups of 20 making the three groups under scrutiny in this study. the first experimental group employed web-based pre-task activities in the process of writing like surfing the Net in order to find the appropriate written materials related to the writing topic, watching the video clips and listening to the audio clips related to the writing topic over the period of the treatment (12 weeks). The second experimental group received the traditional pre-task activities like brainstorming and outlining without any reference to the Internet, just based on the participants' knowledge and memory in the classroom while the control group received no pre-task activities at all and immediately statrted the actual writing task. At the end, the writing performance of all three groups were examined regarding the measures of complexity, accuracy and fluency. The results indicated improvement in Iraqi EFL learners' writing complexity, accuracy and fluency under both Web-based and traditional classroom-based pre-task activities. This means that pre-task activities in general are effective in improving Iraqi EFL learners' writing performance.*

***Key terms:*** *Web-based Pre-task Activities, writing complexity, writing accuracy, writing fluency.*

## Introduction

Writing has been considered as a formidable task for both EFL learners and teachers in most EFL contexts. "Among the four English skills, writing is commonly known as the most difficult but the least liked skill although it plays a crucial role in language production" (Thi Ngoc Anh, 2019, p. 74). Iraqi students like other EFL learners usually face a lot of problems and challenges when they are learning how to write in English. These challenges may arise from a wide variety of factors including inappropriate materials, instruction techniques, teaching methods or students' lack of motivation or interest. Regarding teaching methods and techniques, since 1980s, tasks have been widely used as effective instructional tools in language classrooms (Tavakoli, 2014). However, the question is how the tasks should be designed and used in language classrooms for teaching different skills (Robinson & Gilabert, 2007). Findings of previous studies reveal that the type of tasks and the way they are designed,

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developed and implemented in the classroom affect students' achievement (Ellis, 2009; Foster, 2001). One of the factors, which seem to influence task designe and implemention, is task planning (Skehan, 1996; Yuan & Ellis, 2003). On the other hand, in the last three decades, a process approach has been taken to teaching writing. Seow (2002) believed that writing process is an activity broadly comprising the stages of planning, drafting (writing), revising (redrafting) and editing. Process writing has been considered as "a program of instruction which provides students with a series of planned learning experiences to help them to understand the nature of writing at every point" (Seow, 2002, p. 316).

Meanwhile, new web-based technology has offered a great opportunity for EFL teachers to integrate on-line tasks and activities in their teaching process. Besides, in response to the Coronavirus emergency, a great portion of education all around the world was devoted to on-line teaching. The integration of web-based language teaching into teaching/learning process has offered a plothera of tasks and activities. Web-based language teaching can be employed in order to provide students with a tailored approach to the language materials, which suits their learning styles and their learning purposes. As Hamamorad (2016) stated, Web-based language teaching takes a learner-centered approach and guarantees high degrees of students' involvement.

Due to the enormous benefits of technology-assisted education and the growing necessity of on-line teaching, web-based instruction has been much highlighted. It has been believed that web-based language teaching positively affects students' autonomy, motivation and attitudes (Ward & Newlands, 1998; O'Malley & Chamot 1990). Web-based learning can raise students' awareness and enhance their ability for planning, monitoring and evaluating their own learning, which leads to autonomous learning (O'Malley & Chamot 1990).

In more general terms, the Web offers authentic materials to both EFL teachers and learners. The authentic materials including audio clips, video clips, films, stories, plays and news can be employed in order to provide tailor-made authentic, meaningful and interactive tasks or activities, which take learners' language level as well as their needs into account (Felix, 1999). In other words, Web-based language teaching exploits the sources and tools offered by the Web in order to provide authentic, meaningful learning opportunities for EFL learners.

A lot of studies have investigated the effect of Web-based teaching on different aspects of langauge learning in different EFL contexts. Hamamorad (2016) investigated the relation between Computer Assisted Language Learning tools and language acquisition and learning. He attempted to incorporate technological tools into language teaching through designing a lesson in which EFL language learners were supposed to employ technological tools and the Web in order to do their linguistic tasks and exercises. The results indicated that since Web-based language teaching is learner-centered by nature, it guarantees a considerable amount of engagement and participation in the learning process through student-teacher, student-student and student-content interaction. It also enhances EFL students' motivation and interest in learning.

In a similar study, Edwards and Lane (2021) employed Flipgrid, that is an online video discussion platform, in order to facilitate Japanese EFL students' communication and interaction with peers in the absence of traditional face-to-face communicative activities during the Covid-19 pandemic. The results indicated that although some learners were hesitant to employ Flipgrid, it proved to provide a good potential and an effective platform for interaction and communication in an on-line environment.

Along the same lines, Dousti, Amirian and Nejadansari (2021) investigated the effect of WebQuest-based instruction on Iranian EFL learners' geeeneral writinnng achievements with specific emphasis on elaboration, focus, conventions, vocabulary, and organization sub-skills. For the purpose of this study, the participants in the experimental group performed the

WebQuest-based writing tasks while their control group counterparts followed the writing tasks in the traditional classroom manner. The results indicated the outperformance of the experimental group with regard to organization, focus, elaboration, and vocabulary subskills, but not the conventions sub-skill. The findings of this study had implications about the applicability of new Web-based technologies in Iranian higher education context.

Different aspects of task planning have also been investigated in previous rsearch. For instance, Kargozari, Nezami and Ebrahimi (2019) compared the effect of on-line planning and pre-task planning on Iranian EFL students' argumentative writing performance in terms of accuracy, fluency and complexity under two planning conditions (Pre-task planning and on-line planning). The results indicated neither on-line nor pre-task planning had an effect on writing accuracy. However, it was revealed that on-line planning positively affected fluency while pre-task planning affected writing complexity. It was also found that more proficient participants outperformed in all aspects of writing (accuracy, fluency and complexity) under both on-line and pre-task planning conditions.

The previous studies all confirm the positive effect of technology-related or Web-based instruction on developing EFL writing. However, On the other hand, as previous research reveals (Hamamorad, 2016; Rezaee, Khomeijani Farahani and Mubarak, 2018), the traditional teacher-centered approach to langauge teaching is being followed in most EFL higher education contexts of Iraq. Considering the popularity of task-based instruction on the one hand and the necessity of Web-based teaching and learning on the other, this study was an attempt to employ Web-based pre-task activities in order to follow the basic steps of the writing process including prewriting, brainstorming and outlining, drafting, revising and editing in an on-line vs. a traditional language teaching environment and to examine the effect of Web-based pre-task activities on Iraqi EFL learners' writing development.

In order to achieve these aims, the following research questions were addressed:

1. To what extent do Web-based pre-task activities affect Iraqi EFL learners' complexity of writing?
2. To what extent do Web-based pre-task activities affect Iraqi EFL learners' accuracy of writing?
3. To what extent do Web-based pre-task activities affect Iraqi EFL learners' fluency of writing?
4. Are there any significant differences in Iraqi EFL learners' writing complexity, accuracy and fluency under Web-based pre-task activities, traditional pre-task activities and no pre-task activities conditions?

**Methodolody**

The sample of this study consisted of 60 Iraqi EFL learners from University of Babylon, Iraq. These participants were selected from a larger number of EFL students enrolled in the writing course in the University of Babylon, Fall semester, 2022-2023. They were selected based on their performance on the Oxford Quick Placement Test and were randomly assigned into three groups of 20 making the three groups under scrutiny in this study.

This study used an experimental design in order to find answers to the research questions. The homogenized participants were randomly assigned into three groups. The first experimental group received Web-based pre-task activities. The second experimental group received traditional pre-task activities like brainstorming without any use of the Internet. The control group received no pre-task activities at all and started to write without any focus on pre-wriitng tasks. At the end, the writing performance of all three groups were examined regarding the measures of complexity, accuracy and fluency.

As mentioned above, the first experimental group employed web-based pre-task activities in the process of writing like surfing the Net in order to find the appropriate written materials related to the writing topic, watching the video clips and listening to the audio clips related to the writing topic over the period of the treatment (12 weeks). The second experimental group received the traditional pre-task activities like brainstorming and outlining without any reference to the Internet, just based on the participants' knowledge and memory in the classroom while the control group received no pre-task activities at all and immediately statrted the actual writing task.

Prior to the treatment, in the first session, one of the writing topics of IELTS was given to the participants of the three groups as the pre-test and their performance in terms of writing complexity, accuracy and fluency was measured.

After the whole period of the treatment (12 weeks), the post-test writing task (the same topic of IELTS) was administerd and the participants performance in terms of writing complexity, accuracy and fluency was measured. Then, the within-group and between-group performances of the three groups on the pre-test and post-test were compared.

The actual writing tasks included sample writing tasks from IELTS. Some expository writing topics were selected and worked on during the 12-session treatment. One topic was selected as the pre-test. In order to prevent the test-familiarity effect, another parallel topic was used as the post-test. The performance of the participants of the three groups were examined in terms of writing complexity, accuracy, and fluency.

**Writing Measures**

The unit of analysis in this study was the T-unit. Hunt (1966, p. 735) defined the T-unit as "one main clause plus whatever subordinate clauses happen to be attached to or embedded within it" (p. 735). Since T-units are the major means for measuring the complexity and accuracy of the texts, the students' essays were carefully examined in terms of their clauses; i.e, the independent and dependent clauses. A dependent clause included a verb and at least one additional clause subordinating to it.

**1. Writing Complexity**

In the literature, different measures have been used to operationalize complexity in oral and written productions. For instance, Norris and Ortega (2009) employed three measures including subordination, sub-clausal complexity via phrasal elaboration, and coordination for measuring complexity. In the present study, due to the simplicity of participants' written productions in terms of grammatical structures, subordination was the most prominant indicator of syntactic complexity. Therefore, in this study, following Rezazadeh and Tavakoli (2014), the number of clauses per T-unit and the proportion of subordinate clauses to T-units was used by the researcher to measure the learners' writing complexity. As defined before, the T-unit refers to any main clause with whatever subordinate clauses happen to be embedded or attached to (Hunt, 1966, p. 735). Foster and Skehan (1996) assert that it is a reliable measure correlating well with other measures of complexity.

**2. Writing Accuracy**

As indicated in previous studies, writing accuracy is the easiest to measure. It refers to the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses (Tavakoli & Skehan, 2005). In the present study, for measuring accuracy, first all grammatical and ungrammatical T-units for each essay were meticulously identified and coded. Then, the researcher calculated the proportion of error-free T-units to all T-units (EFT/T) and presented them as percentage in order to measure the learners' writing accuracy. It should be mentioned here that in this study, syntactical errors (e.g., errors in word order or missing the

elements) and morphology (e.g., verb tense, subject-verb agreement, errors in use of articles and prepositions, errors in parts of speech) were only taken into account and errors in lexis (word choice or spelling or punctuation) were ignored in all cases for all participants.

**3. Writing Fluency**

The formula proposed for measuring fluency are mostly applicable to speaking. They consider elements such as breakdowns, pauses, words per minute, clauses per minute, etc. (Skehan, 2009). Some changes are needed in order to make the formula appropriate for measuring fluency in writing. Researchers used various measures like syllables per minute, words per minute, T-units per minute, words in the whole text, and clauses in the whole text for calculating writing fluency (Larsen-Freeman, 2006; Storch & Wigglesworth, 2007; Ong & Zhang, 2011). In this study, following Wigglesworth and Storch (2009), fluency was measured in terms of the average number of words, and average number of clauses and T-units within the specific text produced by the participants.

**Data Analysis**

All participants' written productions were carefully coded and analysed in terms of number of words, number of clauses and number of T-units. That was the first step. In the next step, for each essay, number of grammatically accuare clauses and T-units as well as number of ungrammatical clauses and T-units were carefully counted and double-checked by the supervisor of the study, as the expert in the field of TEFL, in order to guarantee the reliability of the calculations. The reliability coefficient was measured; it was 0.86. All cases of mismathch and inconsistency in counting the clauses/T-units or assigning them as grammatical/ungrammatical were removed before calculating complexity, accuracy and fluency of the participants' written productions.

**Results**

**Writing complexity measures**

In this study, following Rezazadeh and Tavakoli (2014), the number of clauses per T-unit and the proportion of subordinate clauses to T-units were used by the researcher to measure the learners' writing complexity.

In order to find the answers to the first research question, two independent-samples t-tests were run to examine the differences in the performance of the Web-based pre-task group on the pre-test and post-test with regard to writing complexity measured as (a) the number of clauses per T-unit and (b) the proportion of subordinate clauses to T-units.

Regarding writing complexity measured as the number of clauses per T-unit, as Tables 1 and 2 indicate there was a statistically significant increase in the Web-based pre-task group's writing complexity scores measured as the number of clauses per T-unit from pre-test ($M = 1.05$, $SD = 0.22$) to post-test ($M = 2.00$, $SD = 0.00$), $t(19) = -19.00$, $p < 0.0005$ (two-tailed) (Consider that the negative value of t reflects the fact that the post-test had a higher mean than the pre-test). The mean increase in writing complexity measured as the number of clauses per T-unit is -0.95 with a 95% confidence interval ranging from -1.05 to -0.84. The eta squared statistic (0.95) indicated a large effect size considering the guidelines (proposed by Cohen 1988) for interpreting this value as: 0.01 = small effect, 0.06 = moderate effect, and 0.14 = large effect.

Table 1. Paired samples statistics for pre-test and post-test complexity scores measured as the number of clauses per T-unit

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | 1.05 | 20 | .22 | .05 |
| | Post-test | 2.00 | 20 | .00 | .00 |

Table 2. Paired samples test for paired pre-test and post-test complexity scores measured as the number of clauses per T-unit

| | | Paired Differences | | | | | t | Df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test – Post-test | -.95 | .22 | .05 | -1.05 | -.84 | -19.00 | 19 | .00 |

Regarding writing complexity measured as the proportion of subordinate clauses to T-units, as Tables 3 and 4 show there was a statistically significant increase in the Web-based pre-task group's writing complexity scores measured as the proportion of subordinate clauses to T-units from pre-test (M = 0.88, SD = 0.27) to post-test (M = 1.40, SD = 0.43), t (19) = -4.90, p <0.0005 (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test). The mean increase in writing complexity measured as the proportion of subordinate clauses to T-units was -0.52 with a 95% confidence interval ranging from -0.74 to -0.29.

To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing complexity measured as the proportion of subordinate clauses to T-units, eta squared was calculated. The eta squared statistic (0.55) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 3. Paired samples statistics for pre-test and post-test complexity scores measured as the proportion of subordinate clauses to T-units

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | .88 | 20 | .27 | .06 |
| | Post-test | 1.40 | 20 | .43 | .09 |

Table 4. Paired samples test for paired pre-test and post-test complexity scores measured as the proportion of subordinate clauses to T-units

| | | Paired Differences | | | | | t | Df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test-Post-test | -.52 | .47 | .10 | -.74 | -.29 | -4.90 | 19 | .00 |

**Writing accuracy measures**

In this study, following Tavakoli and Skehan (2005), the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses were used by the researcher to measure the learners' writing accuracy.

In order to find the answers to the second research question, two independent-samples t-tests were run to examine the differences in the performance of the Web-based pre-task group on the pre-test and post-test with regard to writing accuracy measured as (a) the proportion of error-free T-units to all T-units and (b) the proportion of error-free clauses to all clauses.

Regarding writing accuracy measured as the proportion of error-free T-units to all T-units, as Tables 5 and 6 demonstrate there was a statistically significant increase in the Web-based pre-task group's writing accuracy scores measured as the proportion of error-free T-units to all T-units from pre-test (M = 4.25, SD = 1.48) to post-test (M = 11.30, SD = 1.68), t (19) = -20.05, p <0.0005 (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test). The mean increase in writing accuracy measured as the proportion of error-free T-units to all T-units was -7.05 with a 95% confidence interval ranging from -7.78 to -6.31.

To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing accuracy measured as the proportion of error-free T-units to all T-units, eta squared was calculated. The eta squared statistic (0.95) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 5. Paired samples statistics for pre-test and post-test accuracy scores measured as the proportion of error-free T-units to all T-units

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | 4.25 | 20 | 1.48 | .33 |
| | Post-test | 11.30 | 20 | 1.68 | .37 |

Table 6. Paired samples test for paired pre-test and post-test accuracy scores measured as the proportion of error-free T-units to all T-units

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test- Post-test | -7.05 | 1.57 | .35 | -7.78 | -6.31 | -20.05 | 19 | .00 |

Regarding writing accuracy measured as the proportion of error-free clauses to all clauses, as Tables 7 and 8 show there was a statistically significant increase in the Web-based pre-task group's writing accuracy scores measured as the proportion of error-free clauses to all clauses from pre-test (M = 0.53, SD = 0.12) to post-test (M = 0.67, SD = 0.11), t (19) = -3.58, p <0.0005 (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test). The mean increase in writing accuracy measured as the proportion of error-free clauses to all clauses was -0.13 with a 95% confidence interval ranging from -0.21 to -0.05.

To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing accuracy measured as the proportion of error-free clauses to all clauses, eta squared was calculated. The eta squared statistic (0.40) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 7. Paired samples statistics for pre-test and post-test accuracy scores measured as the proportion of error-free clauses to all clauses

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | .53 | 20 | .12 | .02 |
| | Post-test | .67 | 20 | .11 | .02 |

Table 8. Paired samples test for paired pre-test and post-test accuracy scores measured as the proportion of error-free clauses to all clauses

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test – Post-test | -.13 | .17 | .03 | -.21 | -.05 | -3.58 | 19 | .00 |

**Writing fluency measures**

In this study, following Wigglesworth and Storch (2009), fluency was measured in terms of the average number of words, the average number of clauses, and the average number of T-units within the specific text produced by the participants.

In order to find the answers to the third research question, three independent-samples t-tests were run to examine the differences in the performance of the Web-based pre-task activities group on the pre-test and post-test with regard to writing fluency measured as (a) the average number of words, (b) the average number of clauses, and (c) the average number of T-units within the specific text produced by the participants.

Regarding writing fluency measured as the average number of words within the specific text produced by the participants, as Tables 9 and 10 demonstrate there was a statistically significant increase in the Web-based pre-task group's writing fluency scores measured as the average number of words within the specific text from pre-test ($M = 43.90$, $SD = 4.11$) to post-test ($M = 85.40$, $SD = 7.08$), $t(19) = -46.17$, $p < 0.0005$ (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test). The mean increase in writing fluency measured as the average number of words was -4.15 with a 95% confidence interval ranging from -43.38 to -39.61.

To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing fluency measured as the average number of words within the specific text, eta squared was calculated. The eta squared statistic (0.99) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 9. Paired samples statistics for pre-test and post-test fluency scores measured as the average number of words within the specific text

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | 43.90 | 20 | 4.11 | .92 |
| | Post-test | 85.40 | 20 | 7.08 | 1.58 |

Table 10. Paired samples test for paired pre-test and post-test fluency scores measured as the average number of words within the specific text

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test – Post-test | -4.15 | 4.01 | .89 | -43.38 | -39.61 | -46.17 | 19 | .00 |

Regarding writing fluency measured as the average number of clauses within the specific text produced by the participants, as Tables 11 and 12 demonstrate there was a statistically significant increase in the Web-based pre-task group's writing fluency scores measured as the average number of clauses within the specific text from pre-test (M = 8.50, SD = 1.70) to post-test (M = 20.15, SD = 2.05), t (19) = -28.71, p <0.0005 (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test). The mean increase in writing fluency measured as the average number of clauses within the specific text was -1.16 with a 95% confidence interval ranging from -12.49 to -10.80.

To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing fluency measured as the average number of clauses within the specific text, eta squared was calculated. The eta squared statistic (0.97) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 11. Paired samples statistics for pre-test and post-test fluency scores measured as the average number of clauses within the specific text

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | 8.50 | 20 | 1.70 | .38 |
| | Post-test | 20.15 | 20 | 2.05 | .46 |

Table 12. Paired samples test for paired pre-test and post-test fluency scores measured as the average number of clauses within the specific text

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test – Post-test | -1.16 | 1.81 | .40 | -12.49 | -10.80 | -28.71 | 19 | .00 |

Regarding writing fluency measured as the average number of T-units within the specific text produced by the participants, as Tables 13 and 14 demonstrate there was a statistically significant increase in the Web-based pre-task group's writing fluency scores measured as the average number of T-units within the specific text from pre-test (M = 8.50, SD = 1.70) to post-test (M = 18.00, SD = 1.45), t (19) = -22.62, p <0.0005 (two-tailed) (Consider that the negative value of t reflects the fact that the post-test has a higher mean than the pre-test.). The mean increase in writing fluency measured as the average number of T-units within the specific text was -9.50 with a 95% confidence interval ranging from -10.37 to -8.62.
To indicate the magnitude of the Web-based pre-task activities' effect on learners' writing fluency measured as the average number of T-units within the specific text, eta squared was calculated. The eta squared statistic (0.96) indicated a large effect size considering the guidelines proposed by Cohen (1988).

Table 13. Paired samples statistics for pre-test and post-test fluency scores measured as the average number of T-units within the specific text

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | Pre-test | 8.50 | 20 | 1.70 | .38 |
| | Post-test | 18.00 | 20 | 1.45 | .32 |

Table 14. Paired samples test for paired pre-test and post-test fluency scores measured as the average number of T-units within the specific text

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | Pre-test – Post-test | -9.50 | 1.87 | .419 | -10.37 | -8.62 | -22.62 | 19 | .00 |

**Comparison of three groups on the pre-test and post-test across the three dimensions of writing complexity, accuracy, and fluency**

In order to answer the fourth research question, ANOVA was used to compare the performance of the three groups on the pre-test and post-test across the three dimensions of writing complexity, accuracy and fluency.

**Comparison of three groups on the pre-test and post-test writing complexity**

A one-way ANOVA was conducted to compare the performance of three groups of Web-based pre-task activities, traditional pre-task activities, and no pre-task activities on the pre-test and post-test writing complexity measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units.
Regarding pre-test complexity measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units, as Table 15 indicates there was not a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing pre-test complexity measured as the number of clauses per T-unit: $F (2, 57) = 0.25$, $p = 0.77$ and writing pre-test complexity measured as the proportion of subordinate clauses to T-units: $F (2, 57) = 0.72$, $p = 0.49$.

Table 15. ANOVA comparing three groups on pre-test complexity scores measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Pre-test complexity measured as the number of clauses per T-unit | Between Groups | .03 | 2 | .01 | .25 | .77 |
| | Within Groups | 3.70 | 57 | .06 | | |
| | Total | 3.73 | 59 | | | |
| Pre-test complexity measured as the proportion of subordinate clauses to T-units | Between Groups | .11 | 2 | .05 | .72 | .49 |
| | Within Groups | 4.34 | 57 | .07 | | |
| | Total | 4.45 | 59 | | | |

Regarding post-test complexity measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units, Table 16 demonstrates that there was a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing post-test complexity measured as the number of clauses per T-unit: $F (2, 57) = 34.20$, $p = 0.00$ and writing post-test complexity measured as the proportion of subordinate clauses to T-units: $F (2, 57) = 17.23$, $p = 0.00$. In line with reaching statistical significance, the actual difference in mean scores between the groups was large. The effect size, calculated using eta squared, for post-test complexity measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units was 0.54 and 0.37, respectively.

Table 16. ANOVA for comparing three groups on post-test complexity scores measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Post-test complexity measured as the number of clauses per T-unit | Between Groups | 8.10 | 2 | 4.05 | 34.20 | .00 |
| | Within Groups | 6.75 | 57 | .11 | | |
| | Total | 14.85 | 59 | | | |
| Post-test complexity measured as the proportion of subordinate clauses to T-units | Between Groups | 2.60 | 2 | 1.30 | 17.23 | .00 |
| | Within Groups | 4.31 | 57 | .07 | | |
| | Total | 6.92 | 59 | | | |

Although the results of ANOVA revealed a significant difference somewhere among the mean scores on post-test writing complexity, it did not indicate which group was different from which other group. Therefore, post-hoc comparisons using the Tukey HSD test were made.

Regarding post-test complexity score measured as the number of clauses per T-unit, as Table 17 shows the mean for Group 1 (web-based pre-task) ($M = 2.00$, $SD = 0.00$) was significantly different from the mean for Group 2 (traditional pre-task) ($M = 1.55$, $SD = 0.51$) and Group 3

(no pre-task) (M = 1.10, SD = 0.30). Moreover, Group 2 (traditional pre-task) (M = 1.55, SD = 0.51) also differed significantly from Group 3 (no pre-task) (M = 1.10, SD = 0.30).
Regarding post-test complexity score measured as the proportion of subordinate clauses to T-units, as Table 17 demonstrates the mean for Group 1 (web-based pre-task) (M = 1.40, SD = 0.43) was significantly different from the mean for Group 2 (traditional pre-task) (M = 0.92, SD = 0.18) and Group 3 (no pre-task) (M = 1.00, SD = 0.00). However, Group 2 (traditional pre-task) (M = 0.92, SD = 0.18) did not differ significantly from Group 3 (no pre-task) (M = 1.00, SD = 0.00).

Table 17. Post-hoc Tukey HSD test on post-test complexity scores measured as the number of clauses per T-unit and the proportion of subordinate clauses to T-units

| Multiple Comparisons | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tukey HSD | | | | | | | |
| Dependent Variable | (I) Groups | (J) Groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| | | | | | | Lower Bound | Upper Bound |
| Post-test complexity measured as the number of clauses per T-unit | 1 | 2 | .45* | .10 | .00 | .18 | .71 |
| | | 3 | .90* | .10 | .00 | .63 | 1.16 |
| | 2 | 1 | -.45* | .10 | .00 | -.71 | -.18 |
| | | 3 | .45* | .10 | .00 | .18 | .71 |
| | 3 | 1 | -.90* | .10 | .00 | -1.16 | -.63 |
| | | 2 | -.45* | .10 | .00 | -.71 | -.18 |
| Post-test complexity measured as the proportion of subordinate clauses to T-units | 1 | 2 | .47* | .08 | .00 | .26 | .68 |
| | | 3 | .40* | .08 | .00 | .19 | .60 |
| | 2 | 1 | -.47* | .08 | .00 | -.68 | -.26 |
| | | 3 | -.07 | .08 | .66 | -.28 | .13 |
| | 3 | 1 | -.40* | .08 | .00 | -.60 | -.19 |
| | | 2 | .07 | .08 | .66 | -.13 | .28 |

*. The mean difference is significant at the 0.05 level.

**Comparison of three groups on the pre-test and post-test writing accuracy**
A one-way ANOVA was conducted to compare the performance of three groups of Web-based pre-task activities, traditional pre-task activities, and no pre-task activities on the pre-test and post-test writing accuracy measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses.
Regarding pre-test writing accuracy measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses, as Table 18 indicates there was not a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing pre-test accuracy measured as the proportion of error-free T-units to all T-units: $F(2, 57) = 0.00$, $p = 1.00$ and the proportion of error-free clauses to all clauses: $F(2, 57) = 0.00$, $p = 1.00$.
Table 18. ANOVA comparing three groups on pre-test accuracy scores measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Pre-test accuracy measured as the proportion of error-free T-units to all T-units | Between Groups | .00 | 2 | .00 | .00 | 1.00 |
| | Within Groups | 125.25 | 57 | 2.19 | | |
| | Total | 125.25 | 59 | | | |
| Pre-test accuracy measured as the proportion of error-free clauses to all clauses | Between Groups | .00 | 2 | .00 | .00 | 1.00 |
| | Within Groups | .97 | 57 | .01 | | |
| | Total | .97 | 59 | | | |

Regarding post-test writing accuracy measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses, Table 19 demonstrates that there was a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing post-test accuracy measured as the proportion of error-free T-units to all T-units: $F (2, 57) = 28.82$, $p = 0.00$ and the proportion of error-free clauses to all clauses: $F (2, 57) = 3.20$, $p = 0.04$. In line with reaching statistical significance, the actual difference in mean scores between the groups was large. The effect size, calculated using eta squared, for post-test accuracy scores measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses was 0.45 and 0.10, respectively.

Table 19. ANOVA comparing three groups on post-test accuracy scores measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Post-test accuracy measured as the proportion of error-free T-units to all T-units | Between Groups | 110.53 | 2 | 55.26 | 23.82 | .00 |
| | Within Groups | 132.20 | 57 | 2.31 | | |
| | Total | 242.73 | 59 | | | |
| Post-test accuracy measured as the proportion of error-free clauses to all clauses | Between Groups | .09 | 2 | .04 | 3.20 | .04 |
| | Within Groups | .79 | 57 | .01 | | |
| | Total | .88 | 59 | | | |

Although the results of ANOVA revealed a significant difference somewhere among the mean scores on post-test writing accuracy, it did not indicate which group was different from which other group. Therefore, post-hoc comparisons using the Tukey HSD test were made.

Regarding post-test accuracy score measured as the proportion of error-free T-units to all T-units, as Table 20 shows the mean for Group 1 (web-based pre-task) ($M = 11.30$, $SD = 1.68$) was significantly different from the mean for Group 2 (traditional pre-task) ($M = 10.00$, $SD = 1.33$) and Group 3 (no pre-task) ($M = 8.00$, $SD = 1.52$). Moreover, Group 2 (traditional pre-

task) (M = 10.00, SD = 1.33) also differed significantly from Group 3 (no pre-task) (M = 8.00, SD = 1.52).

Regarding post-test accuracy score measured as the proportion of error-free clauses to all clauses, as Table 20 demonstrates the mean for Group 1 (web-based pre-task) (M = 0.67, SD = 0.11) and Group 2 (traditional pre-task) (M = 0.68, SD = 0.11) was significantly different from the mean for Group 3 (no pre-task) (M = 0.60, SD = 0.12). However, Group 1 (web-based pre-task) (M = 0.67, SD = 0.11) did not differ significantly from Group 2 (traditional pre-task) (M = 0.68, SD = 0.11).

Table 20. Post-hoc Tukey HSD test on post-test accuracy scores measured as the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses

| Dependent Variable | (I) Groups | (J) Groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Post-test accuracy measured as the proportion of error-free T-units to all T-units | 1 | 2 | 1.30* | .48 | .02 | .14 | 2.45 |
| | | 3 | 3.30* | .48 | .00 | 2.14 | 4.45 |
| | 2 | 1 | -1.30* | .48 | .02 | -2.45 | -.14 |
| | | 3 | 2.00* | .48 | .00 | .84 | 3.15 |
| | 3 | 1 | -3.30* | .48 | .00 | -4.45 | -2.14 |
| | | 2 | -2.00* | .48 | .00 | -3.15 | -.84 |
| Post-test accuracy measured as the proportion of error-free clauses to all clauses | 1 | 2 | -.01 | .03 | .94 | -.10 | .07 |
| | | 3 | .07* | .03 | .12 | -.01 | .16 |
| | 2 | 1 | .01 | .03 | .94 | -.07 | .10 |
| | | 3 | .08* | .03 | .05 | -.00 | .17 |
| | 3 | 1 | -.07* | .03 | .12 | -.16 | .01 |
| | | 2 | -.08* | .03 | .05 | -.17 | .00 |

*. The mean difference is significant at the 0.05 level.

**Comparison of three groups on the pre-test and post-test writing fluency**

A one-way ANOVA was conducted to compare the performance of three groups of Web-based pre-task activities, traditional pre-task activities, and no pre-task activities on the pre-test and post-test writing fluency measured as the average number of words, the average number of clauses, and the average number of T-units within the specific text produced by the participants. Regarding pre-test writing fluency measured as the average number of words, the average number of clauses, and the average number of T-units, as Table 21 indicates there was not a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing pre-test fluency measured as the average number of words: $F(2, 57) = 2.95$, $p = 0.06$, the average number of clauses: $F(2, 57) = 2.02$, $p = 0.14$, and the average number of T-units: $F(2, 57) = 2.02$, $p = 0.14$.

Table 21. ANOVA comparing three groups on pre-test fluency scores measured as the average number of words, the average number of clauses, and the average number of T-units

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Pre-test fluency measured as the average number of words | Between Groups | 76.80 | 2 | 38.40 | 2.95 | .06 |
| | Within Groups | 739.80 | 57 | 12.97 | | |
| | Total | 816.60 | 59 | | | |
| Pre-test fluency measured as the average number of clauses | Between Groups | 6.30 | 2 | 3.15 | 2.02 | .14 |
| | Within Groups | 88.55 | 57 | 1.55 | | |
| | Total | 94.85 | 59 | | | |
| Pre-test fluency measured as the average number of T-units | Between Groups | 6.30 | 2 | 3.15 | 2.02 | .14 |
| | Within Groups | 88.55 | 57 | 1.55 | | |
| | Total | 94.85 | 59 | | | |

Regarding post-test writing fluency measured as the average number of words, the average number of clauses, and the average number of T-units, Table 22 shows that there was a statistically significant difference between the three mentioned groups at the $p < 0.05$ level in writing post-test fluency measured as the average number of words: $F (2, 57) = 97.36$, $p = 0.00$, the average number of clauses: $F (2, 57) = 138.38$, $p = 0.00$, and the average number of T-units: $F (2, 57) = 212.82$, $p = 0.00$. In line with reaching statistical significance, the actual difference in mean scores between the groups was large. The effect size, calculated using eta squared, for post-test fluency scores measured as the average number of words, the average number of clauses, and the average number of T-units was 0.77, 0.82, and 0.88, respectively.

Table 22. ANOVA comparing three groups on post-test fluency scores measured as the average number of words, the average number of clauses, and the average number of T-units

| | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Post-test fluency measured as the average number of words | Between Groups | 6497.20 | 2 | 3248.60 | 97.36 | .00 |
| | Within Groups | 1901.80 | 57 | 33.36 | | |
| | Total | 8399.00 | 59 | | | |
| Post-test fluency measured as the average number of clauses | Between Groups | 574.43 | 2 | 287.21 | 138.38 | .00 |
| | Within Groups | 118.30 | 57 | 2.07 | | |
| | Total | 692.73 | 59 | | | |
| Post-test fluency measured as the average number of T-units | Between Groups | 592.93 | 2 | 296.46 | 212.82 | .00 |
| | Within Groups | 79.40 | 57 | 1.39 | | |
| | Total | 672.33 | 59 | | | |

Although the results of ANOVA revealed a significant difference somewhere among the mean scores on post-test writing fluency, it did not indicate which group was different from which other group. Therefore, post-hoc comparisons using the Tukey HSD test were conducted.

Regarding post-test fluency scores measured as the average number of words, as Table 23 shows the mean for Group 1 (web-based pre-task) (M = 85.40, SD = 7.08) was significantly different from the mean for Group 3 (no pre-task) (M = 61.90, SD = 4.50). Moreover, Group 2 (traditional pre-task) (M = 82.20, SD = 5.43) also differed significantly from Group 3 (no pre-task) (M = 61.90, SD = 4.50).

Regarding post-test fluency scores measured as the average number of clauses, as Table 23 demonstrates that the mean for Group 1 (web-based pre-task) (M = 20.15, SD = 2.05) was significantly different from the mean for Group 2 (traditional pre-task) (M = 16.95, SD = 0.99) and Group 3 (no pre-task) (M = 12.60, SD = 0.99). Moreover, Group 2 (traditional pre-task) (M = 16.95, SD = 0.99) differed significantly from Group 3 (no pre-task) (M = 12.60, SD = 0.99).

Regarding post-test fluency scores measured as the average number of T-units, as Table 23 demonstrates the mean for Group 1 (web-based pre-task) (M = 18.00, SD = 1.45) was significantly different from the mean for Group 2 (traditional pre-task) (M = 14.20, SD = 1.19) and Group 3 (no pre-task) (M = 10.30, SD = 0.80). Furthermore, Group 2 (traditional pre-task) (M = 14.20, SD = 1.19) differed significantly from Group 3 (no pre-task) (M = 10.30, SD = 0.80).

Table 23. Post-hoc Tukey HSD test on post-test fluency scores measured as the average number of words, the average number of clauses, and the average number of T-units

| Dependent Variable | (I) Groups | (J) Groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Post-test fluency measured as the average number of words | 1 | 2 | 3.20 | 1.82 | .19 | -1.19 | 7.59 |
| | | 3 | 23.50* | 1.82 | .00 | 19.10 | 27.89 |
| | 2 | 1 | -3.20 | 1.82 | .19 | -7.59 | 1.19 |
| | | 3 | 20.30* | 1.82 | .00 | 15.90 | 24.69 |
| | 3 | 1 | -23.50* | 1.82 | .00 | -27.89 | -19.10 |
| | | 2 | -20.30* | 1.82 | .00 | -24.69 | -15.90 |
| Post-test fluency measured as the average number of clauses | 1 | 2 | 3.20* | .45 | .00 | 2.10 | 4.29 |
| | | 3 | 7.55* | .45 | .00 | 6.45 | 8.64 |
| | 2 | 1 | -3.20* | .45 | .00 | -4.29 | -2.10 |
| | | 3 | 4.35* | .45 | .00 | 3.25 | 5.44 |
| | 3 | 1 | -7.55* | .45 | .00 | -8.64 | -6.45 |
| | | 2 | -4.35* | .45 | .00 | -5.44 | -3.25 |
| Post-test fluency measured as the average number of T-units | 1 | 2 | 3.80* | .37 | .00 | 2.90 | 4.69 |
| | | 3 | 7.70* | .37 | .00 | 6.80 | 8.59 |
| | 2 | 1 | -3.80* | .37 | .00 | -4.69 | -2.90 |
| | | 3 | 3.90* | .37 | .00 | 3.00 | 4.79 |
| | 3 | 1 | -7.70* | .37 | .00 | -8.59 | -6.80 |
| | | 2 | -3.90* | .37 | .00 | -4.79 | -3.00 |

*. The mean difference is significant at the 0.05 level.

## Discussion

### The effect of Web-based pre-task activities on Iraqi EFL learners' complexity

As reported in chapter 4, in this study, for measuring Iraqi EFL learners' writing complexity, the number of clauses per T-unit and the proportion of subordinate clauses to T-units were mutinously calculated by the researcher.

Regarding writing complexity, the results indicated a statistically significant increase in the Web-based pre-task group's writing complexity scores measured as the number of clauses per T-unit from pre-test (M = 1.05, SD = 0.22) to post-test (M = 2.00, SD = 0.00), t (19) = -19.00, p <0.0005). And the eta squared statistic (0.55) indicated a large effect size. In other words, the use of Web-based pre-task activities significantly improved Iraqi EFL learners' writing complexity. The previous literature on writing highlighted the importance of pre-task activities (Galbraith & Torrance, 2004; Hayes & Nash, 1996; Kellogg, 1990). This finding of the present study was in line with those of Kutlu (2013) who found that in a Turkish EFL context, the use of technology significantly improved the students' writing, specifically regarding their focus on the grammatical form. He stated that EFL learners are able to improve their writing performance more effectively via technological opportunities. This finding of the present study regarding the complexity of writing was also supported by those of Derakhshan

(2018). Generally, this finding can be supported by the cognitive theories of writing (Hayes 1996; Flower & Hayes, 1981), highlighting the importance of pre-task activities for writing specially at the planning stage. The results were also in line with those of Mashhadi, Ahmadi and Rajabi (2020) who reported the positive effect of computer-based concept-mapping on Iranian EFL learners' writing complexity.

**The effect of Web-based pre-task activities on Iraqi EFL learners' accuracy**

Regarding writing accuracy, as reported in the previous chapter, the measures were the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses (Tavakoli and Skehan, 2005). The results of statistical analysis revealed a statistically significant increase in the Web-based pre-task group's writing accuracy from pre-test (M = 4.25, SD = 1.48) to post-test (M = 11.30, SD = 1.68), t (19) = -20.05, p <0.0005 (two-tailed). In the next stage of the statistical analysis, in order to find out the magnitude of the effect of Web-based pre-task activities on Iraqi EFL learners' writing accuracy, the eta squared statistic was used that indicated a large effect size (0.95). This means that the Web-based pre-task activities has significantly improved Iraqi EFL learners' writing accuracy. This finding can be supported by Mashhadi, Ahmadi and Rajabi's (2020) study who reported the effective role of using technological devices (computer-based concept mapping) on Iranian EFL learners' writing accuracy. They believed that the use of technological devices, as an instructional technique, can increase the students' focus on form, and therefore, their accuracy will increase. This finding was also in line with those of Fathi, Saharkhiz Arabani, and Mohamadi's (2021) study who found out that collaborative writing strategies via online platforms like Google Docs significantly improved writing performance of Iranian EFL writers. This finding can also be supported by a previous study which indicated the use of bogs or wikis for teaching writing led to similar promising results (Ebadi & Rahimi, 2017) regarding the effectiveness of using technological devices on EFL learners' writing performance.

**The effect of Web-based pre-task activities on Iraqi EFL learners' fluency**

Regarding writing fluency, this study followed Wigglesworth and Storch's (2009) fluency measures that were the average number of words, the average number of clauses, and the average number of T-units of a specific piece of writing. The results indicated an increase in fluency measures of the experimental group from the pre-test (M = 43.90, SD = 4.11) to the post-test (M = 85.40, SD = 7.08), t (19) = -46.17, p <0.0005 and the eta squared statistic revealed a large effect size (0.9). This revealed that Web-based pre-task activities had a significant effect on Iraqi EFL learners' writing fluency. This finding can be supported by some previous studies like Bikowski and Vithanage's (2016) who indicated that web -based activities were effective in improving L2 learners' writing skills.

**Discussion of the results of comparing three groups on the pre-test and post-test across the dimensions of writing complexity, accuracy, and fluency**

In order to compare the writing complexity of three groups of Web-based pre-task activities, traditional pre-task activities, and no pre-task activities on the pre-test and post-test, a one-way ANOVA was employed, the results of which indicated no difference among the three groups on the pre-test but a statistically significant difference among the three groups at the $p < 0.05$ level of post-test of writing complexity. The results of post-hoc comparisons using the Tukey HSD test revealed that Web-based pre-task activities group outperformed the other two groups and traditional pre-task activities group outperformed the no pre-task activities group in terms of writing complexity. The same case was true regarding accuracy: the results indicated a statistically significant difference among the three mentioned groups at the $p < 0.05$ level in

the post-test of writing accuracy. However, Group 1 (web-based pre-task) (M = 0.67, SD = 0.11) did not differ significantly from Group 2 (traditional pre-task) (M = 0.68, SD = 0.11).

Regarding fluency, there was also a statistically significant difference among the three mentioned groups at the $p < 0.05$ level on the post-test. The results of post-hoc comparisons using the Tukey HSD test for writing fluency also revealed that Web-based pre-task activities group outperformed the other two groups and traditional pre-task activities group outperformed the no pre-task activities group.

These findings are highly supported by previous studies (like Wigglesworth, 1995) which revealed the significance of pre-task planning activities, especially the technology-mediated ones, for improving the writing performance of EFL learners. In the same vein, Suzuki (2017) supported the use of pre-task planning activities on complexity, accuracy and fluency of EFL learners in oral productions.

Along these lines, Ellis (2005) described planning as a "problem solving activity" (p. 3), through which learners wonder "what linguistic devices need to be selected in order to affect the audience in the desired way" (p. 3). Different pre-task activities (e.g., brainstorming, outlining, etc.) can be provided in order to make the learners ready for the actual writing task. A lot of studies have been done in order to examine planning effects on EFL learners' written or oral performance in general or in terms of CAF measures. (Ellis & Yuan, 2004; Gilabert, 2007; Sasayama & Izumi, 2012; Yuan & Ellis, 2003). Besides CAF measures (complexity, accuracy and fluency), vocabulary choice has also been used as an importance benchmark of language proficiency in such studies (Housen, Kuiken, & Vedder, 2012). Most of these studies supported the effectiveness of pre-planning activities on EFL learners' fluency of oral performance, especially in terms of fluency (Gilabert, 2007; Sasayama & Izumi, 2012; Yuan & Ellis, 2003). However, concerning the pre- planning activities effect on complexity and accuracy, the results of previous studies are controversial.

In line with the findings of the present study, Kawauchi's (2005) study indicated considerable increase in EFL learners' writing complexity under the pre-task planning. Yuan and Ellis (2003) also found a very small difference and concluded that although the pre-planning group revealed higher accuracy, the difference was negligible. What can be concluded from the finding of previous studies is that the positive effect of pre-task planning on writing fluency is more considerable than its effect on writing accuracy and complexity (Mochizuki & Ortega, 2008).

One justification for this difference in the effect of pre-task planning on different dimensions of writing performance is related to how the tasks have been operationalized in previous studies by the researchers. Different kinds of pre-planning tasks like brainstorming, narratives, story-telling, summarizing a text, etc. impose different cognitive loads on the learners and have different demands. Therefore, those studies may yield different results. Another important justification is related to learners' characteristics such as their L2 proficiency, familiarity with the tasks, their age and motivation as considered by some researchers (Levkina & Gilabert, 2012). All these factors influence task interpretation and the way the participants treat the tasks in the studies. That's why the effects of those tasks on writing complexity, accuracy and fluency are controversial across different studies.

Another factor which may affect the results is the time given to the participants at the preplanning stage. Some tasks are timed and some of them are online as called in the literature (Ellis, 2005). The results of previous literature (Li, Chen, & Sun, 2015) indicated that the planning time led to different degrees of writing complexity. In other words, the type of task itself and the time given for doing the pre-task activity both can influence participants' writing performance.

One more reason for inconsistencies in the results of previous studies can be to the differences in CAF measures used by the researchers (Ellis, 2009). As mentioned before, there

are different definitions for CAF measures; different scholars have defined the measures for complexity, accuracy and fluency a little different. Some have used more holistic measures like error-free clauses for accuracy (Levkina & Gilabert, 2012), while others take an atomistic view and consider a specific linguistic component (Mochizuki & Ortega, 2008; Ortega, 1999) and some studies even had both measures (e.g., Gilabert, 2007). It seems that the kind of measure used by the previous researchers in order to examine complexity, accuracy and fluency of the written products, have influenced the results of their studies.

**Conclusion**

Pre-task activities have been the focus of much research in the past decade in the realm of EFL learners' oral and written performance (Kawauchi, 2005; Nitta & Nakatsuhara, 2014; Yuan & Ellis, 2003). The results of the present study indicated improvement in Iraqi EFL learners' writing complexity, accuracy and fluency under Web-based pre-task condition. This means that using Web-based pre-task activities like watching short video and audio clips related to the topic they are going to write about can improve their writing performance in all three dimensions of complexity, accuracy and fluency.

On the other hand, the results indicated that the second experimental group that received traditional classroom-based pre-task activities, like brainstorming and outlining, also outperformed the control group, who did not have any pre-task activities and immediately started the actual writing task. This means that pre-task activities, either Web-based or traditional classroom-based can improve Iraqi EFL learners' writing performance across the dimensions of complexity, accuracy and fluency.

This means that pre-task activities in general are effective in improving Iraqi EFL learners' writing performance. The type of task selected for this purpose and the time allotted to accomplishing the task are the contextual factors which should be taken into account by the teacher. In other words, the selection of the pre-task activity (Web-based or traditional, prior to the class or in the classroom, and the amount of time allotted to the task) are all variables that should be decided upon by the teacher based on different contextual factors like students' level of language proficiency, their age, their amount of interest and motivation, their cooperation in classroom activities and tasks, and more importantly, the availability of technological tools and mediations to that group of learners. This means that in some instructional settings, the technological equipment is not easily available to all students or there are some limitations in their use in the classroom. In such cases, the teacher resort to other kind of pre-task activities, which are more easily applicable in the classroom.

Another conclusion of this study is that technology-based activities should be incorporated in classroom practice. Previous studies have all confirmed the positive effects of using technology in writing classrooms on different aspects (complexity, accuracy and fluency) and different components of writing (form including both grammar and word choice, organization, cohesion, etc.) (Carolan, & Kyppö, 2015; Mashhadi, Ahmadi & Rajabi, 2020). In line with the previous studies, it can be concluded from the results of this study that the use of technology-based techniques can lead to improvements in different aspects and components of Iraqi EFL learners' writing performance.

The main theoretical implication of the present study is associated with extending the previous literature on pre-task activities and planning as defined and specified by Ellis (2005). This study indicated that pre-task activities, whether Web-mediated or classroom-oriented, can improve the Iraqi EFL learners' writing complexity, accuracy and fluency. It adds to previous literature on TBLT (task based language teaching).

Besides Web-based activities, traditional classroom-based activities proved effective in this study. In other words, the significant effect of pre-task activities like individual and group

brainstorming and outlining in the classroom prior to the writing practice was confirmed. This finding is in line with what Ellis and Yuan (2004) reported regarding "planning" as the major stage of writing process. The implication of this study is that EFL teachers can employ a wide range of planning activities in EFL writing classes and teach the students how to make use of planning strategies like individual brainstorming, group brainstorming, using checklist to organize ideas, etc.

This study has some pedagogical implications as well. It revealed that using technology is effective in EFL classrooms. Today, the students pass a lot of their time searching the Web, watching different clips and movies, communicating through social media, etc. This time can be spared in a positive way if the teachers employ the same activities in an instructional way. Therefore, teachers can widen their perspective and try to make use of the opportunities provided by the Web, social media, etc. for teaching purposes.

In the same vein, the students can make use of the opportunities provided for them by the Web and social media for learning purposes. The learners can make use of these opportunities as the planning strategies which them flourish the ideas, organize their minds and develop their text in a more effective and efficient manner.

EFL material designers can make use of technology-mediated tasks and activities for developing the materials as well. Such kind of tasks can increase the students' interest and motivation for learning and they feel that language learning is a fun and entertaining activity.

This study suffered from some limitations. First, for pre-task activities, both Web-based and classroom-based, no time limitation was set. In some previous studies, the time devoted to doing tasks was controlled but in the present study, the time was not the concern of the researcher. This study would have led to other results if the time devoted to the pre-planning tasks were somehow controlled. The second limitation was related to the actual writing tasks. In this study, the participants were supposed to write expository texts describing something or some event. Also, the tasks were done individually not in collaboration with peers and groups. The result may change, if the study measures the EFL learners' writing performance on other text types like argumentative or problem-solving, which requires more complicated syntactic structures and organizational patterns. Another limitation is that the present study did not focus on specific components of writing like word choice, grammar, collocations, organization, conjunction and style. It only focused on Iraqi EFL learners' writing performance across measures of complexity, accuracy and fluency.

Further research can investigate the effects of other types of task, like group tasks or participatory tasks, on EFL learners' writing performance. Regarding time devoted to the accomplishment of the tasks, no limitation was set in this study. Further research can examine the role of timed tasks on EFL writers' performance.

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