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## **The Effect of Using Design Thinking on Developing EFL Writing Secondary Stage Students' writing Performance**

*Research derived from a thesis Submitted in partial  
fulfillment of the Requirement for the M.A. Degree in  
Education curricula and Instruction*

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**عنوان البحث :** " تأثير استخدام التفكير التصميمي على تطوير الأداء الكتابي لدى طلاب المرحلة الثانوية في الكتابة باللغة الإنجليزية كلغة أجنبية  
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### مستخلص البحث

هدفت هذه الدراسة الى قياس فاعلية استخدام التفكير التصميمي في تطوير فى تنمية الاداء الكتابي فى اللغة الانجليزية كلغة أجنبية لطلاب المرحلة الثانوية. تلقت مجموعة مختارة عشوائياً من طلاب المرحلة الثانوية (ن = 14) في مدرسة البرج في الخانكة بمحافظة القليوبية تدريباً من خلال برنامجاً مقترحاً يعتمد على استخدام التفكير التصميمي لتطوير الأداء الكتابي. تم تصميم اختبار قبلي وبعدي وتطبيقه على المجموعة قبل وبعد تنفيذ البرنامج المقترح. يهدف الاختبار إلى تحديد إلى أي مدى ساعد التفكير التصميمي طلاب المرحلة الثانوية على إتقان أدائهم الكتابي. وأدوات قياس تقدم المتدربين بما فى ذلك مكونات الاداء الكتابي ، فى الاختبار القبلي والبعدي، مقياس تقدير الاداء الكتابي واستبيان المشاركين. تلق الطلاب المشاركون فى البحث برنامجاً مكثفاً للغة الإنجليزية لمدة تسعة أسابيع ، ثلاث جلسات فى الأسبوع ، لتعزيز أداء الطلاب فى الكتابة. تم تطبيق الاختبار القبلي البعدي على الطلاب وأظهرت النتائج مدى فاعليه استخدام التفكير التصميمي فى تنمية الاداء الكتابي فى اللغة الانجليزية لدى طلاب المرحلة الثانوية كلغة اجنبية.

**الكلمات المفتاحيه :** الأداء الكتابي، التفكير التصميمي

## Abstract

This study investigated the effect of Design Thinking on developing the secondary stage students' EFL writing performance. A randomly selected group of the secondary stage students (N=14) in Al Borg School in Al Khanka in Qalyubia Governorate received training throughout a proposed program based on using Design Thinking for developing writing performance. A pre-posttest was designed and applied to the group before and after the implementation of the proposed program. The test aimed to determine to what extent the Design Thinking Approach helped the secondary stage students to master their writing performance. The researcher designed the research program, and the instruments of measuring the students' progress including the writing performance components list, the pre / posttest, the rubric, and the participants' questionnaire. They received a nine-week intensive English language instruction, three sessions a week, to boost the students' writing performance. The obtained data were statistically analyzed using Wilcoxon Test, and the effect size factor. Both the quantitative and qualitative analysis revealed that design thinking has an effective influence on promoting EFL writing performance.

**Keywords:** EFL writing performance, design thinking

## Introduction

In EFL, writing is a communication technique that helps students express their feelings and ideas. A focus on critical thinking, decision-making, problem-solving, reasoning, and expressing viewpoints are some of the changes that new technology has forced upon writing habits. Writing is a thinking activity in and of itself; therefore critical thinking and writing go hand in hand. Intelligent thought is necessary for writing (Brown, 2011).

Writing assignments can be challenging for a variety of reasons, including the nature of the writing process itself, the students themselves, or teachers, tutors, or professors. It takes more than just perfecting your grammar and spelling to write well. Additionally, numerous studies support pupils' failure to create coherence and consistency in written compositions (Ghasmi, 2013; Meisuo, 2000).

Design Thinking is a method of problem-solving that aids pupils in discovering options and forming future judgments. It is most likely a novel educational strategy for EFL settings. DT is a method for solving creative, cross-disciplinary problems that blends practical knowledge, analytical knowledge, and creative thinking (Vanda, 2011). It is a technique for resolving issues that is based on intricate procedures and mental models that encourage the creation of original answers to issues. It can lead to the creation of new things like systems, narratives, or objects, and it can inspire new sorts of inquiry in classrooms for instructors and students (Goldman & Kabayadondo, 2017).

As a novel method of instruction, design thinking (DT) emphasizes research, planning, prototyping, collaboration, and feedback. Pink (2005) asserts that a new style of knowing, being, and acting will rule the 21<sup>st</sup> century. Students must be able to use writing as a tool for successful self-expression, reflection, criticism, and decision-making to accomplish this. The strategy aids students in evaluating their inventiveness and originality and in applying what they have learned.

It has been demonstrated that using traditional writing strategies can assist pupils to improve their writing. However, they are outdated for writing in the twenty-first century. To help students effectively navigate the real world of the twenty-first century, it is vital to adapt writing skills. Students live in a society where writing is necessary for both academic and professional settings (Leverenz, 2014; Alrehaili, 2019). It is necessary to assess students' writing abilities in EFL using more in-depth, accurate, and time-saving techniques. DT thinking will help EFL students express their ideas and use the resources in fresh ways, empowering them to come up with ideas, get beyond writing challenges, and solve problems (Leverenz, 2014).

### **Context of the Problem**

Writing constitutes a struggle for the secondary stage students, and this is evident in their writing performance.

### **Study questions**

To tackle this problem, the current study sought to investigate the following main question:

**"How can the design thinking approach develop EFL writing performance for the first year secondary stage students "?**

In attempting to answer the above question, the following sub-questions were also answered:

- 1-What are the writing performance components required for the 1st secondary stage students?
- 2-What is the status quo of writing performance level of the targeted students?
- 3-What are the activities and components of a suggested program based on using the design thinking approach for writing performance for the 1st secondary stage students?
- 4-What is the effectiveness of the application of a program based on design thinking on developing writing performance for the targeted students?

### **Aim of the Study**

The purpose of the current study is to investigate the effectiveness of applying design thinking strategy on developing writing performance of the secondary stage students. The model used in this study is the model adopted by the Stamford d. school with some modifications done by the researcher to fit the purpose of the study which is developing and enhancing writing performance of the secondary stage students.

### **Significance of the Study**

Design thinking as a teaching strategy is not well researched in the area of EFL. Few experimental studies have looked at the benefits and advantages of implementing design thinking in numerous fields. To the best of the researcher's knowledge, no experimental study has examined the benefits of incorporating design thinking into the secondary writing instruction of EFL students. Therefore, the study might be useful to EFL teachers in expanding their students' options for group projects and independent learning. This could pave the way for its use in EFL instruction. Additionally, the investigation can close a scholarly gap in the literature. To the researcher's knowledge, no local prior studies have employed design thinking to improve EFL writing performance.

### **Review of literature and Related Studies**

Writing Performance components are numerous, but some of them are selected for this study such as meaning construction, accuracy, coherence, interpretation and reflection. According to (Rico, 2014) incoherent text fails to communicate ideas. Thus, meaning construction, accuracy, coherence, interpretation and reflection can all be regarded as important components in writing performance.

Purdy (2014) made a connection between writing and design thinking. In her 2014 study, Leverenz looked at how design thinking could help students comprehend that academic writing is a creative endeavor in which authors create not only texts but also themselves and their environments. The main forms of creative communication

are writing and design. According to Brown (2009) and Cross (2011), the following is the relationship between writing and design thinking:

- Both are regarded as problem-solving techniques that entail audience participation, brainstorming, planning, rewriting, and publication.
- Rather than relying on a single solution, both procedures call for the generation of several ideas and the consideration of various options.
- Both encourage cross-disciplinary cooperation.
- Design thinking's emphasis on the human being raises students' awareness of their environment and the issues they encounter.

The range of attitudes that might be effective during the writing process explains why DT is important for improving writing performance. Design thinking's primary driver, empathy, serves as a reminder to students of their bigger aspirations as authors. Teachers instruct their students to specify their audiences and goals during the pre-writing stages. Before they start writing, design thinking helps EFL writers connect with their audience and supports them as they go along. As writers learn about the interests, needs, and needs of the audiences. They are writing for, their writing is shaped to better engage those audiences. Students use design thinking to incrementally experiment, use a variety of techniques, mix models, and develop new methodologies that enhance the existing ones. Over the course of the procedure, they develop self-correction.

Sharples (1999) asserts that writing and design in general are both purposeful and creative kinds of material communication that aim to influence others. Lawson (1990) enumerated the characteristics of design; writers also share these characteristics:

The design process is endless, and the writing process is also endless as the writer adds more ideas and changes others when revising his writing. Design problems are open-ended and cannot be fully specified; the same idea is applied to writing as the writer writes with endless goals in mind such as persuading his audience, presenting his ideas, the style, and so forth. Writing is not limited to



a certain style or technique, there is no such thing as the "right design".

Commenting on the previously mentioned studies, it can be said that all the evidence points to DT as a method for resolving complicated issues. It promotes imagination, empathy, understanding, collaboration, ideation, invention, decision-making, visualization, and reflection. The researcher believes that the DT approach's non-one-size-fits-all nature, particularly in the humanities, offers it a more realistic quality in dealing with concepts, evolving issues, and people. Divergent thinking, inventiveness, teamwork, interdisciplinarity are all encouraged by the DT method. Problem-solving, making choices, trying things out and reflecting on the results are all skills that assist EFL writers improve their writing abilities.

As a novel strategy, it promotes creativity and innovation, two vital components of 21st century learning and the information era. The use of the DT approach will encourage students to collaborate across disciplines, and it will also enable teachers to extend their instruction beyond the classroom.

## **Method**

### **1. Design**

To achieve the aim of this study, the research employed a one-group pretest-posttest quasi-experimental design along with a mixed research approach incorporating both quantitative and qualitative assessment.

### **2-Participants of the Study**

The participants of the study were students in the secondary stage (N=14). They were selected randomly from AL Borg School in Al Khanka city in Qalyubia governorate.

### **3- Settings of the Study**

The current study was at AL Borg School at Al Khanka city in Qalyubia governorate where most of the face -to -face interaction, but after the COVID-19 closure, the researcher shifted the experiment to online sessions using Whatsapp group discussions,

and Zoom meetings. The researcher also arranged to meet the participants outside the school to achieve the face to face interaction, after taking all the safety procedures to ensure their safety

#### **4- Instruments of the Study**

To achieve the study aims, the following instruments were designed:

- Pre/posttest of students' writing performance.
- Writing performance rubric .
- Students' satisfaction questionnaire.

#### **The pre/posttest**

##### **Purpose of the test**

The pre / posttest was prepared by the researcher to measure the learners 'writing performance. The test was conducted to determine the students' entry level before applying the program, and after the experimentation, to determine the program's effect on their writing performance.

##### **Description of the pre/post- test**

The test consists of two parts. The first part consists of two questions, students are asked to write their responses in the form of writing. Part two consists of two questions; the respond to them is also in a written form. The total score of the test is 100.

##### **Piloting the Test**

The test was piloted on a group of secondary- stage students from Al Borg Secondary School in AL Khanka supervision. It was administered before teaching the WP program to a group of 30 participants. The purpose of that piloting procedure was to:

- Determine the appropriate time needed to answer the test.
- Check the suitability of the test to the participants concerning the clarity of the questions.
- Establish the reliability of the test.
- Ensure the validity of the test.
- Determining the test time.

## **5-Implementation**

The program is based on adopting DT to enhance the students' WP. The program is divided into three phases: Explore and Ideate, Prototype, and Test. It consists of 14 sessions including two orientation sessions. The first sessions explained the program components and aims. The second illustrated the meaning of the term DT; its usage, processes, application on writing, and its expected positive effect on enhancing WP. Furthermore, the targeted WP components were identified during the application of the 14 session activities. These 14 sessions contain various activities, which were used to elaborate and enhance the WP components. Some essential performance components should be acquired by the end of the program as follows: Identifying essay components. Expanding ideas through collaborative activities. Expanding students' ideas about brainstorming, Mi-Mind, and mind mapping. Finding relationships, and how to link them to their prior knowledge. Enhancing students' writing performance through using DT. Helping students to increase their reflections and interpretations using some online programs such as "Mi- mind", "WhatsApp", and "Grammarly".

The researcher divided the program into three phases: Explore and Ideate, Prototype, and Test. The program consists of two units. The first unit consists of seven lessons of 45 minutes each; the second unit consists of three lessons of 45 minutes each. They aim at presenting the DT approach to students, its definition, steps, values, activities, and its effective impact on writing. They also aim at presenting the general rules used for writing in this stage and how it can be achieved. Furthermore, the targeted WP components were identified during the application of the lessons' activities. These activities contain pictures, picture stories, videos, mind mapping, and X-mind which are used by the researcher to enhance the WP components.

Through the program, students are required to adopt the 21<sup>st</sup> century skills: critical thinking, creative problem- solving, communication, and collaboration.

The content of the program included 14 sessions as the following: The first phase (Explore and Ideate) contains sessions from 1 to 11. The second phase (Prototype) contains sessions 12, and 13. The third phase (Test) contains session 14.

The first phase (Explore and Ideate) aims at: Introducing the study program and its purpose. Writing performance components needed to be enhanced. The way the participants are going to deal with it. What are they expected to perform. Enhancing meaning constructions, coherence, interpretations, and reflections. The second phase (Prototype) aims at: Writing well-organized paragraphs. Writing coherent essays. Enhancing writing with more practice. The third phase (Test) aims at: Sharing writing. Getting feedback to improve writing. Each session lasted for 90 minutes, and is divided into three stages: warming up, procedures, and assessment.

### **Warming up stage**

In this stage, the researcher used materials and activities to lead into the topic highlight some useful ideas and words, brainstorm for ideas, provide a model, visualize some photos, watch some warm-up videos, and make predictions and connections

### **Procedures stage**

In this stage, the participants did the task in pairs or small groups while the researcher monitored them and the whole process. During this stage, students practiced the language while asking, and sharing ideas.

### **Assessment stage**

In this stage, the participants are asked to answer quizzes, identify some written components, write about some topics of interest, create e-mind maps, visualize ideas, and order sentences to complete a story, reflect on ideas, share ideas online and get feedback.

Part one of the test consists of two questions. The first one is ' Write an autobiography", which measures the students' ability to reflect on a self-image and interpret their experience. The second one asked students to choose the best sentence to complete a letter that measures their ability to connect sentences and ideas smoothly both questions also measure their ability to build paragraphs and sentences correctly .

Part two of the test also consists of two questions. The first one is " How did Covid 19 affect your learning process? How do you feel about that?" Measures their ability to come up with clear and logical ideas. The second question is " Look at the picture and imagine your life when The Pandemic of Covid 19 ends. ?" that measures the students' ability to create mental images. Both questions also measure their ability to build paragraphs and sentences correctly, and use correct structure and punctuation.

At the end of the program, the students' writing performance was measured through the same writing test. This time the test was also to be taken in three hours, but was used to assess students' WP at the end of the program. For the present study, this test was considered as pretest and posttest, and both sets were analyzed for performance areas (measured by the rubric) and rated for quality by the researcher depending on the rubric to compare results at the beginning and end of the program and to address the research questions.

## **Results of the Study**

To perform all the statistical analyses of this study, SPSS 20 was used

### **Results for Writing Performance**

The results of the study were fulfilled by answering the research main question: "How can the design thinking approach develop EFL writing performance for secondary stage students?" The answer to the previous question comes from the first hypothesis.

### Testing the First Hypothesis

The first hypothesis states that "There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations concerning the development of their "overall WP" favoring the post-test scores.

To verify this hypothesis, the researcher examined the hypothesis, and the results of both pre and posttest administrations were statistically analyzed and compared to determine the significance between the learners' "overall WP" mean scores in the pre and post - administrations of the WP test using Wilcoxon Test for paired samples to obtain Z value score for related samples and both the positive and negative ranks in addition to the P-value. These results are clarified in Table 1:

**Table 1**

*Descriptive statistics of the writing Performance pre and post tests*

Component	Ranks	N	M	S. R	mean		Std. Deviation		Z	Sig .	Effect size
					pre	post	pre	post			
Overall WP	Positive Ranks	14	7.50	105.00					3.298	0.001	1
	Negative Ranks	0	0.00	0.00	55.73	94.61	5.69	4			Very strong
	Ties	0	0.00	0.00							
	Total	14									

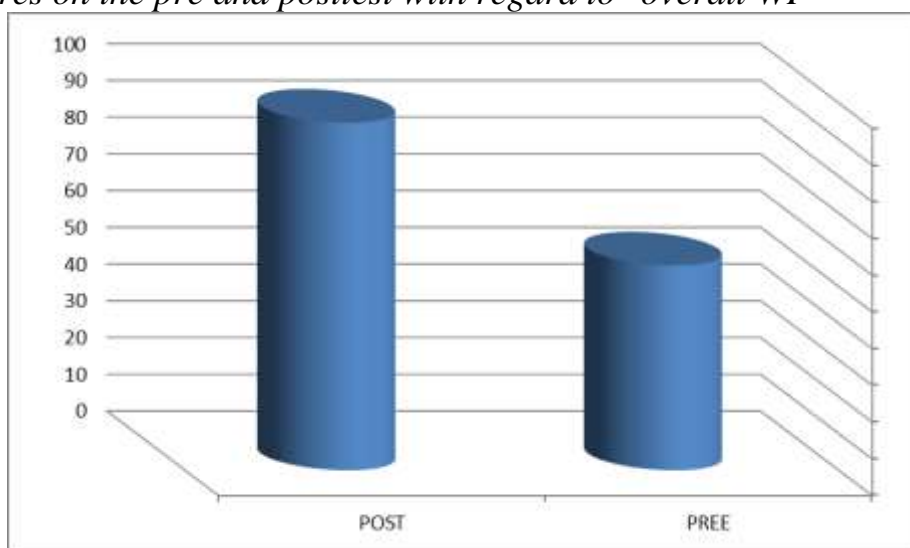
Table 1 clarifies that the participants' mean scores in the post administration of writing performance test as a whole were higher than their mean scores in the pre administration. This indicates that

the study participants achieved progress in the writing performance components as a whole as a result of the proposed program. In addition, the standard deviation of participants' scores in the post administration of writing performance test as a whole was lower than the pre administration.

The table also shows that the significance level (sig.) is less than (0.01) this indicates that there is a statistically significant difference at the (0.01) level between the mean scores of the study participants on the pre and post writing performance test as a whole in favor of the posttest scores. This means that the H0 should be rejected .

Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted which states that " There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations with concerning the development of their "overall WP" favoring the post test scores". Therefore the researcher has answered the third question that states " **What is the effectiveness of the application of a program based on design thinking on the targeted students?**

**Figure 1:** illustrates the difference between the students' mean scores on the pre and posttest with regard to "overall WP"



To calculate the impact of the proposed program on the research group, the researcher relied in her calculation on what Abdel Hamid (2016: 279-280) indicated when using the Wilcoxon Test to calculate the difference between the mean ranks of the pairs of related degrees, and when the results prove a statistically difference between the ranks of the related pairs of degrees or between the ranks of the two measurements, before and after, it is possible to know the strength of the relationship between the independent and dependent variables by using the binary correlation coefficient for the ranks of the related pairs Matched- Pairs Rank Biserial Correlation ,which is calculated from the following mathematical formula:

$$r = (4(T1)/ n (n+1)) -1 \dots\dots (1)$$

Where:

r = strength of the relationship (the binomial correlation coefficient for the ranks of the related pairs).

T1= sum of all positive sign ranks

n = number of pairs of scores

And (r) is interpreted as follows

- If:  $(r) < 0.4$  indicates a weak effect size.
- If:  $0.4 \leq (r) < 0.7$ , it indicates an average effect size.
- If:  $0.7 \leq (r) < 0.9$ , it indicates a strong effect size.
- If:  $(r) \geq 0.9$  indicates a very strong effect size.

From table(1),it is clear that the effect size of the overall WP =1.This indicates that the proposed program that based on design thinking approach is highly effective in developing the writing performance of the 1<sup>st</sup> secondary stage students as a whole.

### **Testing the second hypothesis .**

The H02 states that "There is a statistically significant difference between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their **"interpretation and reflection "** favoring the posttest scores."

To verify this hypothesis, the researcher examined the hypothesis, and the results of both pre and posttest administrations were statistically analyzed and compared to determine the significance between the learners' **" interpretation and reflection "** mean scores in the pre and post administration of the WP test using "Wilcoxon Test" for paired samples to obtain Z value score for related samples



and both the positive and negative ranks in addition to the P-value. These results are clarified in Table 2:

**Table 2**

*Paired Samples Wilcoxon Test results comparing pre - post administrations mean Scores of students' grade ranks in the WP Regarding 'interpretation and reflection '.*

Component	Ranks	N	M	S.R	Mean		Std. Deviation		Z	Sig.	Effect size
					pre	post	pre	post			
<b>interpretation and reflection</b>	<b>Positive Ranks</b>	14	7.50	105.00					3.310	0.001	1
	<b>Negative Ranks</b>	0	0.00	0.00	10.93	19.00	1.18	1.69			Very strong
	<b>Ties</b>	0	0.00	0.00							
	<b>Total</b>	14									

Table 2 clarifies that the participants mean scores in the post administration of writing performance test concerning their "**interpretation and reflection**" were higher than their mean scores in the pre administration. This indicates that the study participants achieved progress in their "**interpretation and reflection**" as a result of the proposed program. In addition, the standard deviation of participants' scores in the post administration of their "**interpretation and reflection**" was higher than the pre administration.

The table also shows that the significance level (sig.) is less than (0.01) this indicates that there is a statistically significant difference at the (0.01) level between the mean scores of the study participants on the pre and post writing performance test concerning their'

'**interpretation and reflection** "in favor of the posttest scores. This means that the H02 should be rejected.

Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted which states that " There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their" 'interpretation and reflection " favoring the post test score.

From table 2, it is clear that the calculated effect size regarding " "interpretation and reflection ", expressed by the Matched- Pairs Rank Biserial Correlation, =1.This indicates that the proposed program that based on design thinking approach is highly effective in developing the "interpretation and reflection of the secondary stage students.

### **Testing the Third Hypothesis .**

The third hypothesis states that "There is a statistically significant difference between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their "**accuracy**" favoring the post test scores.

To verify this hypothesis, the researcher examined the hypothesis, and the results of both pre and posttest administrations were statistically analyzed and compared to determine the significance between the learners' " **accuracy** " mean scores in the pre and post administrations of the WP test using Wilcoxon Test for paired samples to obtain Z value score for related samples and both the positive and negative ranks in addition to the P-value. These results are clarified in Table 3:

### **Table 3:**

*Results of Differences for Paired Samples between the students' Mean Scores on the Pre and the Post WP Administration Test with Regard to their "accuracy"*

Component	Ranks	N	M	S.R	Mean		Std. Deviation		Z	Sig.	Effect size
					Pre	post	pre	post			
accuracy	Positive Ranks	14	7.50	105.00							1
	Negative Ranks	0	0.00	0.00	11.66	18.61	1.11	1.75	3.298	0.001	Very strong
	Ties	0	0.00	0.00							
	Total	14									

Table 3 clarifies that the participants mean scores in the post administration of writing performance test concerning their "accuracy" were higher than their mean scores in the pre administration. This indicates that the study participants achieved progress in their implementing correct structure as a result of the proposed program. In addition, the standard deviation of participants' scores in the post administration of their implementing correct structure was higher than the pre administration

The table also shows that the significance level (sig.) is less than (0.01) this indicates that there is a statistically significant difference at the (0.01) level between the mean scores of the study participants on the pre and post writing performance test concerning their implementing correct structure in favor of the posttest scores. This means that the H03 should be rejected.

Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted which states that " There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their "accuracy" favoring the post test scores

From table 3, it is clear that the calculated effect size regarding "accuracy", expressed by the Matched- Pairs Rank Biserial Correlation, =1. This indicates that the proposed program that based on design thinking approach is highly effective in developing the accuracy of the secondary stage students

**Testing the Fourth Hypothesis.**

The fourth hypothesis states that "There is a statistically significant difference between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their "coherence" favoring the post test scores.

To verify this hypothesis, the researcher examined the hypothesis, and the results of both pre and posttest administrations were statistically analyzed and compared to determine the significance between the learners' "coherence" mean scores in the pre and post administrations of the WP test using Wilcoxon Test for paired samples to obtain Z value score for related samples and both the positive and negative ranks in addition to the P-value. These results are clarified in Table 4:

**Table 4**

*Results of Differences for Paired Samples between the students' Mean Scores on the Pre and the Post WP Administration Test with Regard to their "coherence"*

component	Ranks	N	M	S.R	Mean		Std. Deviation		Z	Sig.	Effect size
					pre	post	pre	post			
Coherence	Positive Ranks	14	7.50	105.00							1
	Negative Ranks	0	0.00	0.00	10.21	19.80	0.40	2.29	3.309	0.001	Very strong
	Ties	0	0.00	0.00							
	Total	14									

Table 4 clarifies that the participants mean scores in the post administration of writing performance test concerning their "Coherence" clarifies that the participants mean scores in the post administration of writing performance test concerning their "Coherence " were higher than their mean scores in the pre administration. This indicates that the study participants achieved progress in their " Coherence " as a result of the proposed program. In addition, the standard deviation of participants' scores in the post administration of their moving smoothly for further written parts" was higher than the pre administration

The table also shows that the significance level (sig.) is less than (0.01) this indicates that there is a statistically significant difference at the (0.01) level between the mean scores of the study participants on the pre and post writing performance test concerning their" Coherence" in favor of the posttest scores. This means that the H04 should be rejected

Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted which states that " There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their" Coherence " favoring the post test scores".

From table 4, it is clear that the calculated effect size regarding " Coherence, expressed by the Matched- Pairs Rank Biserial Correlation, =1.This indicates that the proposed program that based on DT approach is highly effective in developing students' Coherence written parts of the secondary stage students.

#### **Testing the Fifth Hypothesis**

The fifth hypothesis states that "There is a statistically significant difference between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their " **meaning construction**" favoring the post test scores

To verify this hypothesis, the researcher examined the hypothesis, and the results of both pre and posttest administrations were statistically analyzed and compared to determine the significance between the learners' " **meaning construction** " mean scores in the pre and post administrations of the WP test using Wilcoxon Test for paired samples to obtain Z value score for related samples and both the positive and negative ranks in addition to the P-value. These results are clarified in Table 5.

**Table 5**

*Results of Differences for Paired Samples between the students' Mean Scores on the Pre and the Post WP Administration Test with Regard to their "meaning construction"*

Component	Ranks	N	M	S.R	Mean		Std. Deviation		Z	Sig.	Effect size
					pre	post	pre	post			
meaning construction	Positive Ranks	14	7.50	105.00							1
	Negative Ranks	0	0.00	0.00	11.36	18.57	2.06	2.13	3.300	0.001	Very strong
	Ties	0	0.00	0.00							
	Total	14									

Table5 clarifies that the participants mean scores in the post administration of writing performance test concerning their" **meaning construction** " clarifies that the participants mean scores in the post administration of writing performance test concerning their" **meaning construction** " were higher than their mean scores in the pre administration. This indicates that the study participants achieved progress in their" " **meaning construction** " as a result of the proposed program. In addition, the standard deviation of

participants' scores in the post administration of their **meaning construction** " was higher than the pre administration.

The table also shows that the significance level (sig.) is less than (0.01) this indicates that there is a statistically significant difference at the (0.01) level between the mean scores of the study participants on the pre and post writing performance test concerning their "**meaning construction** " in favor of the posttest scores. This means that the H05 should be rejected

Consequently, the null hypothesis was rejected and the alternative hypothesis was accepted which states that " There is a statistically significant difference at the significance level of 0.05 between the mean scores of the study participants on the pre and post WP test administrations with regard to the development of their "**meaning construction** " favoring the post test scores

From table 5, it is clear that the calculated effect size regarding " meaning construction", expressed by the Matched- Pairs Rank Biserial Correlation, =1.This indicates that the proposed program that based on design thinking approach is highly effective in developing "meaning construction of the secondary stage students ."

The results of the study showed that the participants ' writing performance was enhanced as a result of the treatment. Verifying the hypotheses of the study, the results of the statistical analysis showed that there was a significant difference between the mean scores of the study participants on the pre and post writing performance test as a whole and regarding each writing performance component in favor of the posttest mean scores. This indicated that the participants' writing performance was enhanced after being taught using the DT program. This revealed a positive effect of using DT approach on enhancing the year secondary stage students 'writing performance. This may be due to the following reasons :

DT approach was efficient in building an effective learning environment. The students themselves were an essential part of the learning environment. Students were not just seen as language users

but also knowledge producers and decision makers. They started employing different thinking strategies to approach writing tasks. They could construct and interpret meaning, reflect on ideas, analyze, inquire and collaborate to solve complex writing problems.

Furthermore, all the program's materials selected that were, videos, pictures, cartoons, etc. were motivating and raised learners' interest. They helped learners to acquire the language faster, and made learners more confident. That helped students to deal with writing from a safe zone and expressed their ideas forgetting their past struggle with writing tasks. As a result, all their writings were expressive and increased their participation and motivation. Participants were able to build meaningful knowledge. These findings were consistent with the results of the studies by Charles (2022), Bason, (2013), Cross (2004).

### **Conclusions**

This study aimed at investigating the effectiveness of using DT in developing the students' English language performance in general and on developing the secondary stage students in particular. Based on the quantitative and qualitative analyses of the elicited data, the following conclusions were gleaned:

- The DT program proved to be effective in enhancing the participants' WP in general.
- The DT program proved to be effective in enhancing every single component of the students' WP.
- The DT program was also effective in developing the students' awareness of the basic WP concepts.

### **Recommendations**

The following recommendations are evoked based on the prior outcomes and findings: Much time and funding should be devoted to the instruction using DT to master the concept, investigating the effectiveness of using the DT approach on students in language schools, investigating the effectiveness of using the DT approach on university students, investigating the effectiveness of using the DT



approach on a large sample, increasing the number of hours of actual learning based on meeting face to face with students, diversification of the proposed activities in the program to appeal to all levels of students.

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