Effect of Critical Thinking Instruction through *Thinker's Guide* on Reading Skill and the Critical Thinking Ability of EFL Learners[1]

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Abstract

Critical thinking (CT) is essential for survival in the modern knowledge-driven world, and the Thinker's Guide is considered an effective technique to enhance such potential. The investigation of CT potential to enhance the reading comprehension of EFL learners has not received adequate attention in the literature. Accordingly, this study aimed to investigate the effects of using the *Thinker's Guide* technique on Iranian English as a foreign language (EFL) learners' CT and reading ability. In so doing, the Oxford Quick Placement Test and the reading section of an IELTS practice test were used to test 90 intermediate male and female EFL learners' performance on CT and reading comprehension skills. The techniques used in the *Thinker's Guide* (accuracy, precision, clarity, relevance, depth, breadth, logic, significance, and fairness) were provided to the learners as essential standards to enhance their CT potential and reading ability. Next, the California Critical Thinking Skills Test (CCTST) and IELTS reading section were administered at the pre-test and post-test stages. The data were analyzed by paired-samples t-test and two-way ANOVA. The results revealed the advancement in the five sub-elements of CT and reading ability from pre-test to post-test. It can be concluded that the *Thinker's Guide* training improved the CT and reading ability of EFL learners. Therefore, EFL teachers, learners, and materials developers might benefit from including CT training in the courses and materials.

Resumen

El pensamiento crítico (PC) es esencial para la supervivencia en el mundo moderno, impulsado por el conocimiento, y la Guía del Pensador se considera una técnica eficaz para potenciar dicho potencial. La investigación sobre el potencial del PC para mejorar la comprensión lectora de los estudiantes de inglés como lengua extranjera (EFL) no ha recibido la atención adecuada en la literatura. Por consiguiente, este estudio tuvo como objetivo investigar los efectos del uso de la técnica de la Guía del Pensador en el PC y la capacidad lectora de los estudiantes iraníes de inglés como lengua extranjera (EFL). Para ello, se utilizaron el Oxford Quick Placement Test y la sección de lectura de un examen de práctica del IELTS para evaluar el rendimiento de 90 estudiantes de inglés como lengua extranjera (hombres y mujeres) de nivel intermedio en PC y comprensión lectora. Las técnicas utilizadas en la Guía del Pensador (exactitud, precisión, claridad, relevancia, profundidad, amplitud, lógica, significancia y equidad) se proporcionaron a los estudiantes como estándares esenciales para mejorar su potencial de PC y su capacidad lectora. A continuación, se administraron el California Critical Thinking Skills Test (CCTST) y la sección de lectura del IELTS en las etapas previa y posterior. Los datos se analizaron mediante la prueba t de muestras pareadas y un ANOVA de dos vías. Los resultados revelaron un avance en los cinco subelementos del PC y la capacidad lectora, desde la prueba previa hasta la prueba posterior. Se puede concluir que la capacitación de la Guía del Pensador mejoró el PC y la capacidad lectora de los estudiantes de inglés como lengua extranjera (EFL). Por lo tanto, los profesores, estudiantes y desarrolladores de materiales de EFL podrían beneficiarse de la inclusión de la capacitación en PC en los cursos y materiales.

Introduction

Critical thinking (CT) is systematic, self-directed thinking describes thinking in line with a particular domain or mode of thinking (Farrell, 1996). It is while reflecting about different subjects or problems people can enhance the quality of their understanding by imposing intellectual standards on the thinking structures (Paul et al., 1993). Carter et al. (2017) defined it as the individual's inclination to analyze, evaluate, and enhance their thinking process. The *Thinker's Guide* elaborates on general notions connected with CT and special reasoning skills vital to thinking productively for varied purposes and tasks. It is based on the model proposed by Richard Paul (1990) and it has three major elements. The first factor is the element of thought, also known as reasoning. Then there are intellectual standards that are meant to be applicable to the elements of reasoning, and finally there is a skilled critical thinker's main intellectual traits rooted in the appropriate and organized use of intellectual standards within the elements of thought. In addition, the existence of guidance in CT can facilitate finding an answer to numerous questions and challenges (Paul & Elder, 2006).

It has been a long-proved issue that some acceptable degree of CT ability and analytic reasoning is required to find a practical outcome in education (Facione, 1990). Effective thinkers can reflect critically,

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communicate efficiently, and find a solution to various problems as CT contributes to thinking logically, manipulating evidence, and revealing previously unknown information (Zare & Biria, 2018). According to Reed and Kromely (2001), highly complex issues are processed and analyzed through CT to suggest alternative perspectives based on specific criteria for making appropriate inferences and reaching logical conclusions using reliable evidence. Ruggiero (2012) suggested that critical thinkers are those who can move beyond "typical" thinking models and apply more sophisticated ways of thinking and generate improved ideas when compared to mediocre thinkers. Finally, Halpern (2014) viewed critical thinking as "the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is used to describe thinking that is purposeful, reasoned, and goal-directed" (p. 8).

Thinker's Guide is a cognitive instructional technique that can be regarded as an asset to enhance CT skills, leading to the improvement of reading abilities based on its inherent characteristics (Zare & Biria, 2018). The metacognitive approach set in Paul's (1990) exposition of CT is the fundamental concept in developing the *Thinker's Guide*. which employs metacognition to inspire students to look at thought confusion.

While one of the goals of instruction is to prepare students to comprehend second-language texts, analyzing and organizing such a text into its reasonable components is rarely taught explicitly in language classes. Since many students do not attend language classes with developed analytical skills, they benefit less from readings and course assignments. Also, standard L2 pedagogy provides moderate improvements in learners' analytical-reasoning abilities. The integration of language and thinking skills has become a prominent area of research in second language acquisition, moving beyond a historical neglect to a more central focus (Ziegler & González-Lloret, 2022). While earlier foundational literature, such as that by Krashen (1982), often emphasized language acquisition as a separate, input-driven process, recent scholarship emphasizes the inextricable link between language and cognition and the benefits of integrating these skills in instruction. Teachers and learners need to be cognizant of the fact that CT expands the learning experience of the learners and makes the endeavor of language learning more meaningful for them. It has been indicated that CT has a high degree of correlation with the learners' achievements, and different studies have confirmed the role of CT in language learning, e.g., language proficiency (Bagheri, 2015; Liaw, 2007; Veliz & Veliz-Campos, 2019).

Therefore, *Thinker's Guide* principles can equip learners with analytical skills to process various reading texts and draw appropriate inferences and conclusions. English as a foreign language (EFL) teachers can also benefit from the advantages of such pedagogical tools to teach reading comprehension materials more profoundly. Materials developers can also regard these cognitive methodological techniques and include related exercises in textbooks and supplementary materials.

Literature Review

Critical Thinking is the way of thinking about any topic, issue, or problem in which the individuals skilfully inspect the elements of their way of thinking by managing the deep-seated interrelated elements in thinking and assessing them to use the best intellectual standards in a difficult situation (Elder & Paul, 2001). Having considered the key constituents of CT and the distinctive features from the previous studies and the Delphi Report[5], Paul and Elder (2001) highlighted that students' needs for CT must be regarded at all levels. They created? a set of tools called the *Thinker's Guide* to stimulate higher-level skills of CT. It includes general models associated with CT and special CT skills indispensable for thinking most efficiently and taking action.

Facione (1990) expressed that the analytical ability to think critically might not be sufficient without having the metacognitive disposition to exercise those skills. He stated that individuals might have the cognitive skills required for skilled reasoning, but using these skills might be another problem. However, there is agreement among scholars of CT research (e.g., Facione, 1990; Halpern, 1998; Jia et al., 2019; Kassem, 2021; Kosior et al., 2019) that meta-cognition as a vital element should be included in reasoning to make individuals aware of and monitor their thinking style. The *Thinker's Guide* can pave the way for developing CT potential.

Thinker's Guide

Paul and Elder (2001) argued that general concepts concerning critical thinking and its specific skills are of essence to a wide range of disciplines and tasks. The *Thinker's Guides* are based on Paul's (1990) model of

[5] In 1990, a group of 46 experts on CT got together to agree on a definition of what it is. They also wanted to decide what skills and attitudes a person needs to be a critical thinker. Their final report, called The Delphi Report, listed 19 important attitudes (e.g., flexibility and persistence) that help people think critically. (Available at: https://philarchive.org/archive/faccta)

critical thinking that has three main components that include elements of thought/reasoning, intellectual standards and intellectual traits. Paul and Elder contended that this model of critical thinking could meet the challenge of many demands of reasoning (Paul & Elder, 2006).

Regarding the element of thought/reasoning, Paul and Elder (1997) stated that students need to learn two essential dimensions of thinking to promote their thinking. They need to identify the "parts" of their thinking and assess their use. They also stated that every reasoning includes a purpose, and an attempt is made to figure something out, pose some questions, and find solutions to some problems. They further stated that giving reasons is based on assumptions. Individuals are supposed to recognize their assumptions and decide whether they can be justified, and find how these assumptions construct their point of view. They also said that reasoning is done from some point of view. One is supposed to state his viewpoint to differentiate it from that of the others. They highlighted that reasoning should be based on data, information, and evidence. For this purpose, individuals should make claims based on information and evidence, search for information for or against their reasoning, ensure that all information used is accurate and relevant to the question at hand, and attempt to be fair-minded in evaluating all points of view.

To base reasoning on conceptions and thought, one should recognize fundamental concepts, expound them transparently, weigh substitute concepts or definitions, and ensure that one uses concepts thoughtfully and accurately. Moreover, Paul and Elder (1997) claimed that reasoning encompasses inferences or interpretations which, in turn, allow us to reach certain conclusions and assign meaning to data. When reasoning is based on inferences and interpretations, one can express what the evidence indicates indirectly, examine inferences for their congruity with each other and recognize assumptions that lead him to the inferences. Finally, all reasoning results in some points or has implications and consequences. One should discern the implications and consequences and reason based on them, search for unfavorable and favorable implications, and consider all probable after-effects.

The second element, i.e., intellectual standards, is used to determine the quality of reasoning. The intellectual standards include: a) clarity, the ability to elaborate and illustrate what someone means by giving examples, b) accuracy, the ability to find out whether a statement is true by verifying and testing it, c) precision, the ability to be more specific and more exact by giving more details, d) relevance, the ability to relate the issue to the problem in a way that helps us solve the problem, e) depth, the ability to realize the factors that make the issue difficult and the ability to deal with some of the difficulties we need to deal with, e) breadth, the ability to look at the issue from another perspective, consider it from another point of view and analyse the need to look at it in other ways, f) logic, the ability to see whether what we claim makes sense and to check whether one's paragraph fits in with one's last one and what one says follows the evidence, g) significance, the ability to check whether the problem one considers is the most important one or not and whether this problem is the central idea to consider, and h) fairness, the ability to check the justifiability of one's thinking in context and to take into account the thinking of others (Paul & Elder, 1997).

Lastly, the third element, known as intellectual characteristics, is intertwined with nurturing a sophisticated critical thinker. This refinement is achieved through the unwavering and disciplined use of intellectual standards in the various components of thought. According to the insights shared by Paul and Elder (1997), there exist two pivotal dimensions of thinking that students must adeptly navigate to elevate their cognitive prowess. They must possess the skill to recognize the intricate "parts" of their thinking and the ability to judiciously evaluate how these components are employed in their thought processes. Intellectual traits include intellectual integrity, intellectual autonomy, intellectual perseverance, intellectual courage, and intellectual empathy.

Fahim and Sa'eedpour (2011) investigated the effect of teaching CT and debate strategy on reading comprehension and whether participation in classroom discussion influences CT ability. Their findings revealed that discussion did not affect CT ability; however, it improved EFL learners' reading comprehension.

Marijic and Romfelt (2016) studied five English teachers' viewpoints regarding CT and the methods they used to assess Sweden's senior high school students. Teachers stated that they used student-centered pedagogies and formative assessment to enhance the CT abilities; however, they had no concrete method to assess it. In general, the teachers adopted a narrow definition of CT. Zare and Biria (2018) investigated English for special purposes learners' CT ability and reading comprehension. The findings revealed that CT influenced reading comprehension such that advanced critical thinkers outperformed those ranked poorer on CT.

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In a relevant study, Esfandiari et al. (2021) carried out a study to examine Iranian EFL students' reading and critical thinking skills through argument mapping techniques. The participants were two groups including 30 male and 30 female Iranian EFL learners. Both groups were tested using the California Critical Thinking Skills Test and the reading section of an IELTS Practice Test as pre-tests. Then, both groups were introduced to argument mapping techniques. The results showed that argument mapping techniques enhanced the EFL students' critical thinking and reading skill.

No similar study has been found in the literature to investigate the effect of the *Thinker's Guide* method on improving CT and reading comprehension of EFL learners, especially in the context of Iran. Therefore, the present study aimed to answer the following questions:

1. Does *Thinker's Guide* training have any significant effect on male and female EFL learners' reading comprehension?

2. Does *Thinker's Guide* training have any significant effect on male and female EFL learners' critical thinking ability?

Method

Research design and setting

A quantitative pre-test-treatment-post-test quasi-experimental design was used in this research. The independent variables were CT instruction via *Thinker's Guide*, and the dependent variables were CT and reading abilities. Two Iran Language Institute branches in Isfahan, Iran, were selected to conduct the experiment. The rationale behind using this institute was its reputable ranking compared to other institutes and the multitude of learners.

Participants

Sixty (60) male and female EFL learners studying English in intermediate classes at the previously mentioned institute participated in this research. The participants were selected randomly and their first language was Persian with ages ranging from 17 to 25 years old. They were chosen from a population of 120 EFL learners at the institute according to their Oxford Quick Placement Test (OQPT) scores. They were then assigned to either the experimental group receiving treatment through TG or the control group which did not receive the treatment.

Before choosing the participants, the language institute officials were contacted and they were informed of the objectives of this study. After their permission was granted, the students were informed that they would be taking part in a research project on English Language Teaching (ELT); however, they did not receive any information on the methodological details of the study because providing participants with the full purpose and specific hypotheses of the study would have introduced a significant risk of bias, potentially altering their behavior or responses and compromising the validity of the results. Specifically, it was decided that full disclosure would have likely led participants to consciously or unconsciously modify their actions to align with what they believed to be the study's goals. By withholding this information, it was possible to observe more natural and genuine responses, which was critical for the integrity of the research. A full debriefing was conducted immediately following the study's conclusion. During this debriefing, participants were provided with a complete explanation of the study's purpose, the nature of the deception, and the reasons it was necessary. An opportunity was also given them to ask questions and withdraw their data if they wished. No participants chose withdrawal.

The students were ensured that the data obtained from them would remain confidential and would not influence their final exam scores. They all filled out the written consent form prior to the study.

Instruments

California Critical Thinking Skills Test (CCTST; Facione, 1990)

CCTST is planned to objectively assess the major reasoning skills required for reflective judgmental procedures, mainly focusing on what to believe or do. It has been frequently used in many studies on CT (e.g., Hadar & Genser, 2015). The completion of CCTST-2000 takes 45 minutes; however, it is possible to administer the test untimed. In this study, the administration of the Persian version of the California Critical Thinking test was in an untimed format so that the participants faced no serious problems understanding the items. Students were respectively administered Form A as the pre-test and Form B as the post-test.

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This test includes 34 multiple-choice items measuring the sub-tests of analysis, interpretation, inference, evaluation, explanation, induction, and deduction. The reliability coefficients of its sub-tests estimated by Cronbach's alpha ranged between .78 and .80 (Facione, 1990). This test was translated into Persian by Khodamoradi et al. (2006) and was reported to have acceptable construct validity. The reliability coefficients of the sub-tests in the present study were as follows: .62 for the whole test, .77 for inference, .71 for analysis, .71 for deductive reasoning, .71 for inductive reasoning, and .77 for evaluation.

IELTS Reading Section

The reading passages were selected from the Cambridge IELTS book 5 (2006). It took 60 minutes for students to read the passages and answer 40 multiple-choice comprehension questions. IELTS reading test sample was used to measure the participants' reading ability before and after the CT treatment. The test was piloted among 15 intermediate EFL learners from the same branches of the institute to ensure test reliability, and its reliability estimated by KR-21 was 0.78. The content validity of the test was confirmed by three TEFL university professors with notable experience in testing and measurement.

Oxford Quick Placement Test (Quick Placement Test, 2001)

As was mentioned above, the OQPT, a sixty-item multiple-choice test, was administered at the beginning of the study to have a homogenized sample. The test comprises two parts. Part One includes 40 items; five items on testing situations, 15 items in cloze passages, testing prepositions, grammar, pronouns, and vocabulary, and 20 completion items. The second part includes 20 items, including cloze passages (10 items) and completion type items (10 items).

Data collection procedure

First, the students were asked to mention the purpose of the writer of the passage. They were required to convince each other in the case of disagreements. It should be noted that the first author conducted the study and was present when the students mentioned the purpose of the writer and helped them in finding the purpose if needed. Some students found the purpose correctly; however, some deviated from the main point and needed to be convinced and corrected by the others who were on the right path. Second, the students were encouraged to convince each other on whether the writer cited relevant evidence, experiences, and information related to the topic or not. Here, they were grouped to discuss the most important points missed by the writer. They were encouraged to mention the missing information related to the passage.

Third, the students were asked to discuss whether the writer clarified the concepts where necessary or not. More precisely, they were asked to state how the writer shows sensitivity to what they assumed to be correct. For this purpose, they were asked to find the reasoning explained by the writer on how they came to a conclusion. To further check the writer's sensitivity, students were also encouraged to consider the alternative points of view or lines of reasoning mentioned by the writer. Fourth, the students were asked to consider the writer's objections from other points of view. They were encouraged to consider the writer's sensitivity to alternative points of view and check their sensitivity to the implications and consequences of their position. To discuss the objections proposed by others, they were grouped and asked to convince each other of the most rational objections proposed by the writer.

Finally, the student's personal understanding of the text was checked. They were instructed to ask themselves questions and put their answers in their own words. Moreover, they were asked to write about the key terms and the purpose of the passage. They were mostly encouraged to paraphrase what they understood about the text. They were directly taught the paraphrasing technique. The experimental condition of the *Thinker's Guide* and a control condition were set up to compare the learners' reading comprehension and CT scores before and after the instruction. The data were analyzed by paired-samples t-test and two-way ANOVA.

Results

Thinker's Guide and critical thinking

Table 1 presents the results of the paired-samples t-test, comparing the pre-test and post-test scores of male and female learners in the Thinker's Guide group (TGG).

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	Tests	M	N	SD	T	df	Sig.
Male	Pre-Analysis	3.00	30	.87	-3.83	29	.00
	Post-Analysis	3.73	30	.82			
	Pre-Deductive	5.13	30	1.40	-2.14	29	.04
	Post-Deductive	5.83	30	.91			
	Pre-Inference	3.53	30	1.10	-1.68	29	.10
	Post-Inference	3.93	30	.69			
	Pre-Inductive	4.40	30	1.75	-.76	29	.45
	Post-Inductive	4.73	30	1.59			
	Pre- Evaluation	4.23	30	1.04	-.72	29	.47
	Post-Evaluation	4.43	30	1.10			
Female	Pre- Analysis	2.93	30	.82	-3.59	29	.00
	Post-Analysis	3.56	30	.67			
	Pre-Deductive	5.10	30	1.09	-1.97	29	.058
	Post-Deductive	5.63	30	1.18			
	Pre-Inference	3.46	30	1.00	-2.08	29	.04
	Post-Inference	3.83	30	.91			
	Pre-Inductive	4.26	30	1.04	-.98	29	.33
	Post-Inductive	4.60	30	1.61			
	Pre-Evaluation	4.13	30	.89	-.87	29	.38
	Post-Evaluation	4.36	30	1.03			

Table 1: Male and female learners' pre-test and post-test scores

As shown in Table 1, the performance of the male learners in the five subscales of CT improved from pre-test to post-test. However, the improvement was statistically significant only in the analysis and deductive reasoning sub-tests. The female learners' performance improved in all the sub-tests of CT from the pre-test to the post-test. Still, their improvements were of statistical significance only in the analysis and inference sub-tests.

Effects of different interventions and gender on critical thinking

To determine whether the learners' performance in the TGG and CG groups was different or not and whether there was a difference between male and female learners in these groups, we conducted the two-way analysis of variance (ANOVA) for each sub-test twice. First, the pre-test scores were compared to ensure they were not different at the outset of the study. Second, the post-test scores were compared to see if the interventions affected the learners' CT differently. For reasons of space, the pre-test tables are not reported here (since the differences between the groups and male and female learners were not statistically significant, which means the learners were homogeneous at the beginning of the study), and the results of the post-test scores are presented below.

Gender	Groups	M	SD	N
Male	CG	3.16	1.26	30
	TGG	3.73	.82	30
Female	CG	3.20	1.32	30
	TGG	3.56	.67	30
Total	CG	3.18	1.28	60
	TGG	3.65	.75	60

Table 2: Male and female analysis

As for the male learners, the mean scores of the CG and TGG learners were 3.16 and 3.73, respectively. Regarding female learners, likewise, the CG learners obtained lower mean scores. The same was found for the total scores of male and female learners. A two-way ANOVA was run to determine whether the differences between the two groups and male and female learners were statistically significant (Table 3).

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	23.02	5	4.60	4.33	.00	.11
Intercept	2368.93	1	2368.93	2227.68	.00	.92
Gender	.05	1	.05	.04	.82	.00
Groups	22.57	2	11.28	10.61	.00	.10
Gender * Groups	.40	2	.20	.18	.82	.00
Error	185.03	174	1.06			
Total	2577.00	180				
Corrected Total	208.06	179				

Table 3: Two-way ANOVA analysis for the males and females

There was a significant difference in the post-test scores of the two groups in the analysis sub-test ($p < .05$) (Table 3). However, the same was not found for gender ($p > .05$), which means that gender did not significantly influence the learners' performances. The interaction effect of the type of instruction and gender was not statistically significant ($p > .05$). The following two Tables show the deductive reasoning post-test scores.

Gender	Groups	M	SD	*N*
Male	CG	5.40	1.42	30
	TGG	5.83	.91	30
Female	CG	5.46	1.04	30
	TGG	5.63	1.18	30
Total	CG	5.43	1.24	60
	TGG	5.73	1.05	60

Table 4: Male and female deductive reasoning

The highest mean score belonged to the TGG learners for both male and female learners. Table 5 shows whether the differences between the two groups and male and female learners were statistically significant.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	39.46	5	7.89	5.35	.00	.13
Intercept	6265.80	1	6265.80	4246.62	.00	.96
Gender	.08	1	.08	.06	.80	.00
Groups	38.80	2	19.40	13.14	.00	.13
Gender * Groups	.57	2	.28	.19	.82	.00
Error	256.73	174	1.47			
Total	6562.00	180				
Corrected Total	296.20	179				

Table 5: Two-way ANOVA for the male and female deductive reasoning

There was a significant difference in the deductive reasoning post-test scores of the two groups ($p<.05$). Nonetheless, gender differences were not of statistical significance, nor was the interaction effect of the type of instruction and gender. The male and female learners' post-test scores of the inference sub-test are presented below (Table 6).

Gender	Groups	Mean	SD	*N*
Male	CG	3.70	1.02	30
	TGG	3.93	.69	30
Female	CG	3.73	.63	30
	TGG	3.83	.91	30
Total	CG	3.71	.84	60
	TGG	3.88	.80	60

Table 6: Male and female inference

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As shown in Table 7, the male and female learners in the TGG group obtained higher scores. The two-way ANOVA Table below shows whether the differences between the two groups and female and male learners reached statistical significance.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	9.77	5	1.95	2.79	.01	.07
Intercept	2816.35	1	2816.35	4021.16	.00	.95
Gender	.08	1	.08	.12	.72	.00
Groups	9.54	2	4.77	6.81	.00	.07
Gender * Groups	.14	2	.07	.10	.90	.00
Error	121.86	174	.70			
Total	2948.00	180				
Corrected Total	131.64	179				

Table 7: Two-way ANOVA for the male and female inference

There was a significant difference in inference post-test scores of the two groups ($p<.05$), but gender differences did not significantly affect the learners' performances, nor did the interaction between the type of instruction and gender. The inductive reasoning post-test scores of male and female learners are presented below (Table 8).

Gender	Groups	M	*SD*	*N*
Male	CG	4.70	1.41	30
	TGG	4.73	1.59	30
Female	CG	4.56	1.10	30
	TGG	4.60	1.61	30
Total	CG	4.63	1.26	60
	TGG	4.66	1.59	60

Table 8: Male and female inductive reasoning

Concerning the sub-test of inductive reasoning, TGG had higher mean scores. The results of the two-way ANOVA needed to be checked to find whether the difference between male and female learners was statistically significant (Table 9).

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	16.04	5	3.20	1.40	.22	.03
Intercept	4243.75	1	4243.75	1854.37	.00	.91
Gender	.08	1	.08	.03	.84	.00
Groups	15.24	2	7.62	3.33	.03	.03
Gender * Groups	.71	2	.35	.15	.85	.00
Error	398.20	174	2.28			
Total	4658.00	180				
Corrected Total	414.24	179				

Table 9: Two-way ANOVA for the male and female inductive reasoning

Table 9 shows a statistically significant difference between the two groups regarding their inductive reasoning post-test scores. Yet, gender differences could not significantly affect the learners' inductive reasoning skills nor the interaction between the type of instruction and gender. The evaluation post-test scores of the two groups of male and female learners are presented below (Table 10).

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Gender	Groups	M	SD	*N*
Male	CG	4.50	1.07	30
	TGG	4.43	1.10	30
Female	CG	4.43	1.19	30
	TGG	4.36	1.03	30
Total	CG	4.46	1.12	60
	TGG	4.40	1.06	60

Table 10: Male and female evaluation

As to the evaluation sub-test, the CG group obtained higher scores (Table 10). The results of the two-way ANOVA Table (Table 11) determine whether the differences between the two groups and genders were statistically significant.

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	1.18	5	.23	.17	.97	.00
Intercept	3618.05	1	3618.05	2739.91	.00	.94
Gender	.13	1	.13	.10	.74	.00
Groups	1.03	2	.51	.39	.67	.00
Gender * Groups	.01	2	.00	.00	.99	.00
Error	229.76	174	1.32			
Total	3849.00	180				
Corrected Total	230.95	179				

Table 11: Two-way ANOVA for the male and female evaluation post-test scores

Table 12 indicates no statistically significant difference between the two groups regarding their evaluation post-test scores. Similarly, gender differences could not significantly influence the learners' evaluation scores, nor could the interaction effect between the type of instruction and gender.

Results for reading comprehension

The pre-test and post-test comprehension reading scores of the TGG group are presented below for both genders (Table 12).

Gender	Tests	M	*N*	*SD*	*T*	*Df*	*Sig.*
Male	Pre-test	18.26	30	3.45	-11.42	29	.00
	Post-test	23.86	30	2.43			
Female	Pre-test	18.33	30	3.35	-12.18	29	.00
	Post-test	24.03	30	3.46			

Table 12: Paired-samples t-Test for the reading comprehension pre- and post-test scores of the male and female participants of the TGG group

As the results show, both male and female learners' reading comprehension significantly improved after treatment ($p<.05$).

Discussion

This study aimed to investigate the effects of using the *Thinker's Guide* technique on Iranian EFL learners' critical thinking (CT) and reading ability. The reading section of an IELTS practice test was used to assess the performance of 90 intermediate male and female EFL learners on CT and reading comprehension skills. Male and female EFL learners' pre-test and post-test scores in the *Thinker's Guide* group were compared by a paired-samples t-test. The analysis revealed that the reading comprehension of both male and female learners significantly improved after treatment. In terms of CT, the male learners' CT only improved in the analysis, deductive reasoning, and inference sub-tests. Regarding female learners, an improvement in CT was observed in the analysis and inference subtests. These findings are discussed below.

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The findings of the first research question demonstrated that CT training enhanced the reading performance of Iranian EFL learners. In general, research findings have substantiated the positive effectiveness of CT in boosting reading comprehension (Barjesteh & Vaseghi, 2012; Gómez B., 2010; Mendenhall & Johnson, 2010; Moghadam et al., 2023). Kamali and Fahim (2011) attributed learners' ability to find unknown words in a reading comprehension text to their CT skills. CT skills were also found to be significantly and strongly correlated with Iranian EFL learners' reading comprehension (GhorbanDordiNejad & Heydari, 2012) and university students' self-efficacy (Dehghani et al., 2011).

Furthermore, consistent with the findings of this research question, Fahim and Sa'eepour (2011) investigated the effect of teaching critical thinking skills on the reading comprehension ability of Iranian EFL learners and reported an enhancement in the CT group following the training. Mohseni et al. (2020) also studied the impact of critical thinking awareness-raising training on reading general, cause and effect, and argumentative texts. The findings demonstrated that the training significantly enhanced reading performance on general and argumentative texts, but not on cause-and-effect texts.

To theoretically justify the enhanced reading comprehension following CT training, it can be stated that critical thinking processes involve analysis, evaluation, inference, and explanation —essential cognitive skills that facilitate a deeper understanding and interpretation of texts (Facione, 2011). When EFL learners engage in CT training, they develop metacognitive strategies that enable them to approach reading material more analytically and reflectively, thereby improving comprehension (Lai, 2011; Poulíková et al., 2024).

Finally, from a cognitive perspective, the role of CT aligns with Bloom's cognitive domain, where higher-order thinking skills are central to meaningful learning (Bloom et al., 1956). By fostering these skills, learners can better identify main ideas, interpret nuanced meanings, and make inferences, which are crucial for effective reading comprehension (Rivadeneira-Barreiro, 2020).

The findings of the second research question regarding male learners were that their CT only improved in analysis, deductive reasoning, and inference sub-tests. Some research suggests that, on average, males tend to exhibit stronger spatial reasoning abilities and a preference for systematizing information (e.g., Bartlett & Camba, 2023; Kimura, 2004). Analysis often involves mentally manipulating concepts, organizing information logically, and identifying patterns, which might align with these tendencies. While not directly related to critical thinking, these cognitive strengths can indirectly support analytical skills in a structured learning environment.

Additionally, some studies suggest that men may prefer a trial-and-error, experimental approach to problem-solving and tend to gravitate towards subjects with clear structures and logical problem-solving (Gurian, 2010). With its emphasis on breaking down thought into explicit elements (e.g., elements of thought, intellectual standards), the Thinkers' Guide might resonate with a preference for structured problem decomposition for men, which is a key aspect of analysis.

In terms of deductive reasoning, a purported male strength in abstract reasoning and systematization could be highly beneficial for deductive reasoning. Deductive tasks often require understanding abstract rules, applying them systematically, and following logical chains of thought (Kazali, 2025; Lippa, 2010). This may justify the improvement in deductive reasoning among male EFL learners.

Moreover, some neuroscientific perspectives, such as those suggesting that the "male brain" is optimized for intra-hemispheric communication (Ingalhalikar et al., 2014), may theoretically relate to strengths in logical, sequential processing that underpin deductive reasoning. However, it is crucial to approach such theories with caution, as brain differences are complex and their direct impact on specific cognitive skills, such as critical thinking, is not fully established or universally accepted.

Regarding the male EFL learners' improvement in inference sub-test, it can be stated that while sometimes considered a more "intuitive" skill, effective inference relies heavily on the ability to integrate disparate pieces of information, recognize patterns, and identify logical connections. Some studies (e.g., Kusnierz et al., 2020; Santrock, 2011), particularly in fields like science and mathematics where a systematic approach is valued, might show male learners demonstrating strong abilities in drawing conclusions from presented data.

Additionally, some research suggests that males may be more inclined to take risks and engage in hypothesis generation (e.g., Harris & Jenkins, 2006; Zeffane, 2015). Inference often involves formulating plausible hypotheses based on incomplete information. If the Thinkers' Guide encourages a more assertive or investigative approach to understanding text and situations, it might leverage this tendency.

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The finding of the second research question regarding female EFL learners was that CT improvement was observed in the analysis and inference sub-tests following the treatment. In terms of analysis sub-test, research frequently indicates that, on average, females tend to exhibit stronger verbal abilities and communication skills (e.g., Katili, 2023; Wallentin, 2009). Analysis often requires precise articulation of ideas, identification of subtle linguistic cues, and the ability to deconstruct arguments verbally. The Thinkers' Guide, with its emphasis on clarity, precision, and logical reasoning, often requires learners to articulate their analytical process, which could align well with stronger verbal capabilities.

Furthermore, some studies and general observations suggest that females may pay closer attention to detail and nuance in language and social interactions (e.g., Reid et al., 2003). Analysis demands a careful examination of components and their subtle interconnections. The Thinkers' Guide's emphasis on identifying assumptions, implications, and different points of view necessitates a detailed and nuanced approach that might resonate more with this tendency.

In general, the implementation of the Thinkers' Guide technique involved discussion, group work, or peer feedback (common in critical thinking instruction), which could have particularly benefited female learners. Research often indicates that females may thrive in collaborative learning environments and benefit from verbal processing and sharing of ideas (e.g., Cheng, 2019). The process of articulating analytical insights in discussions can solidify understanding.

Regarding the inference sub-test, female learners are sometimes observed to be more attuned to implicit information and social cues in communication (e.g., Baron-Cohen, 2002, who highlights empathy and 'mind-reading' in typical female cognitive profiles; Hsu & Sung, 2025). This sensitivity, when transferred to textual or argumentative contexts, can aid in identifying underlying assumptions, unstated implications, and the nuances needed to draw strong inferences from incomplete information. The Thinkers' Guide teaches how to look for these hidden elements explicitly and is therefore beneficial for female EFL learners.

Ultimately, it can be stated that inference often involves synthesizing information from multiple sources to form a coherent conclusion. Some research suggests females may be particularly adept at integrating diverse information, often including qualitative data or complex narratives (e.g., Halpern, 2000, discusses a range of cognitive differences). The Thinkers' Guide's emphasis on considering different points of view and implications helps learners systematically integrate information to make stronger inferences.

Conclusion

As a response to the question of whether an instructional program, namely the *Thinker's Guide*, can improve the reading comprehension of Iranian EFL learners, the statistical analysis revealed the positive effects of *Thinker's Guide* on critical thinking (CT) and reading comprehension improvement of male and female EFL learners. The *Thinker's Guide* has three pivotal building blocks: thought/reasoning, intellectualization-driven standards, and traits. This mode of thinking makes individuals avoid taking a cursory look at any subject, content, or problem. It controls structures involved in thinking and forces intellectualization-driven standards upon them (Paul & Elder, 2001).

Regarding the theoretical implications of the present study, this study may enhance global insight into the impact of argument mapping and the Thinkers' Guide on the CT and reading comprehension abilities of Iranian EFL learners. The findings of the study are supportive of second language acquisition theories and approaches as well as the theories of mind already put forward by scholars in the field, such as Critical Theory by Plato, Vygotsky's social constructivist theory of mind, and the theory of social interdependence. Thus, the ideas highlighted in such theories are generalizable to the Iranian EFL context through the findings of this study.

Furthermore, the proper enhancement of CT skills would bring significant benefits for EFL learners. They would encourage curiosity in the learners. Effective critical thinkers are curious about a large number of topics and generally have broad interests. They maintain a sense of curiosity about the world and its inhabitants, coupled with an awareness of and admiration for the diverse cultures, beliefs, and perspectives that collectively define our shared human experience (Marin & Halpern, 2011). Such individuals are always alert to opportunities and try to seize them. CT skills also enhance creativity. Success in education, in general, and language achievement, in particular, are closely related to creativity. It is quite axiomatic that critical thinkers are also creative thinkers. Finally, the development of critical thinking skills needs proper practice. Thus, appropriate and relevant exercises and drills are required to enhance such skills critically. This is the time when textbook designers and curriculum developers can leverage the study's findings to

introduce changes to current language education curricula, considering the benefits of incorporating argument mapping and thinkers' guide principles into language learning materials.

The proper execution of studies inevitably comes with certain limitations, and this research was no different. One notable constraint was the scarcity of comprehensive literature addressing the same issue, representing a significant drawback in this particular domain. In other words, there was a lack of comprehensive and helpful studies on the effects of instructing thinkers' guides on the critical and reading abilities of Iranian EFL learners. Another limitation of this research seems to be the sample size. The participants of this study consisted of a limited number of Iranian EFL learners studying at the Iran Language Institute, one of the language institutes in Iran. Thus, generalizing the results to other language centers, public and private schools, as well as university levels, should be done with caution.

Finally, one major limitation of the study was the novelty of the instructional techniques for the learners. EFL learners are generally accustomed to practicing reading comprehension through reading texts and applying routine strategies such as skimming and scanning; however, the new approach of instructing through '*Thinker's Guides'* and argument mapping was time-consuming and daunting.

In conclusion, critical thinking is essential for students to live, work, and function effectively in our present and rapidly changing society. They should make evaluations, judgments, and choices each day regarding the kind of information they need to obtain, use, and believe. As adults, students live in a complex world where individual and collective actions necessitate the proper selection, processing, and use of information.

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