The Impact of Teaching Critical Thinking on Iranian Students' Writing Performance and Their Critical Thinking Dispositions

Ali Taghinezhad
Department of English Language, Shiraz Branch, Islamic Azad University, Shiraz, Iran
taghinezhad1@gmail.com

Mohammad Javad Riasati[2]
Department of English Language, Shiraz Branch, Islamic Azad University, Shiraz, Iran
mjriasati2002@yahoo.com

Ehsan Rassaei
Department of English Language, Shiraz Branch, Islamic Azad University, Shiraz, Iran
ehsanrassaei@yahoo.com

Fatemeh Behjat
Department of English Language, Abadeh Branch, Islamic Azad University, Abadeh, Iran
fb_304@yahoo.com

Abstract

This study was intended to investigate the effectiveness of teaching critical thinking on students' writing performance and their critical thinking dispositions. To this end, 140 students were selected. 73 students were assigned to the experimental group and 67 were assigned to the control group. The experimental group received instruction in critical thinking strategies whereas the control group did not. The instruments used in this study were the researcher-developed essay test, the Ennis-Weir critical thinking essay test, and the California Critical Thinking Dispositions Inventory (CCTDI). A 2-group pretest/posttest quasi-experimental design was utilized to determine the outcome measures. Data were analyzed using descriptive statistics and independent-samples t-test. Statistically significant differences were observed in the experimental and the control groups in the total scores of the three instruments. The results indicated an improvement in students' writing performance and their dispositions toward using critical thinking strategies. Nonetheless, some dispositional aspects such as truth-seeking, cognitive maturity, and open- mindedness did not differ significantly after the intervention.

Keywords: Critical Thinking Dispositions Inventory, Academic Writing Performance, Ennis-Weir Critical Thinking Essay Test, Critical Thinking Explicit Instruction

1. Introduction

The instruction of cognitive skills such as critical thinking is not a completely new phenomenon. It originated from Greek philosophy and received Dewey's support after the Second World War. It was modified by Bloom in the 1950s and became popular in the 1990s. From Socratic era to contemporary concerns about educated citizens and high-quality workforces, the ability to think critically and to think rationally is regarded as the primary and necessary result of education (Reed, 1998).

Today, more important than ever, teaching students critical thinking and rational thinking is considered to be the core of liberal education (Giancarlo and Facione, 2001). Critical thinking is always a process which includes assessing one's own thinking process or all other steps in the thinking process of others (Sims, 2014). Critical thinking is also thought of as an active and ingenious process of conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered or generated by observation, experience, reflection, reasoning, or communication as an intellectual process (Scriven and Paul, 2004; Sezer, 2008). This is a process

[2] Corresponding author

that can contribute to the use of cognitive skills or strategies to increase the likelihood of a favorable outcome (Halpern, 2007; Baker, Rudd, and Pomeroy, 2001). Dewey (1933) pointed out that learning to think is the main purpose of education. Dressel and Mayhew (1954) believe that educational institutions are responsible for teaching students to go beyond simple mental activities and recall of the ideas and facts. Some scholars, including Scriven maintain that critical thinking training should be the primary task of education (Scriven, 1985).

Today, the world needs people with critical thinking qualities to meet the ever-increasing life challenges. Prerequisite for employment in the global economy, the survival of democratic lifestyles, and personal decision-making in a complex and rapidly changing society require individuals who can reason well and make sound judgments. As a country moves toward a technology-based economy, it needs trained personnel who can face global competition, meet employers' needs, be flexible and analytic in thinking, integrate information from a myriad of sources and perspectives, and can effectively make profitable and efficient decisions. Psychologists, philosophers, and educators (Halpern, 2007; King, 1994) believe that making rational decisions needs the ability to analyze, evaluate, interpret, and synthesize information accurately from various sources, and it is an indispensable tool for successfully accomplishing tasks in a complex and ever-changing world for students, staff, and citizens. Developing critical thinking skills among undergraduates is an essential life skill that has received extraordinary attention in the past two decades. Critical thinking can be developed among college students (Halpern, 1998; Tsui, 2002), especially if critical thinking instruction and student practice are permeated throughout the curriculum (Condon and Kelly-Riley, 2004).

Despite widespread expression of concern for the development of critical thinkers, observations and current empirical studies show that most schools, colleges, and universities neither challenge the students to think critically about academic subjects nor do they help them develop reasoning abilities to succeed in dealing with the difficulties of modern life. Although active learning methods or student-centered teaching which help students think about what they do would dominate the educational practices of schools and universities our education system still provides students with traditional teaching models. The erroneous daily reasoning and poor debate techniques used by most students (verbally and in writing) suggest that even university education seems to have a limited impact on the critical thinking ability of students, including the rational interpretation of texts and formulation of unbiased arguments. The possible reasons for this shortcoming are as follows: (a) Teachers do not receive critical thinking training when they are in college education, and they do not even know what critical thinking means. (b) There are few or no standard textbooks and/or reference books in critical thinking. (c) Teachers do not have the time and teaching resources to incorporate critical thinking skills into their classroom teaching methods (d). Teachers teach implicitly rather than explicitly. These shortcomings are very important because critical thinking is highly relevant to students' achievement.

Like many other countries, the education policy implemented in Iran vividly shows that the pedagogical implications of constructivism would influence the teaching practices in schools. However, the available empirical evidence shows that education in Iran is still characterized by traditional teaching methods. Unfortunately, traditional education models just allow students to receive rather than seek knowledge. In this teaching mode, the spread of knowledge is considered authoritative and can be passed from teacher to student. It is assumed that knowledge and procedures must be instilled in students who are passive recipients during the learning process (Ramsden and Moses, 1992). This approach also reinforces the importance of traditional implicit models that provide critical thinking instruction and simply regard critical thinking as an implicit goal of the curriculum (Reed, 1998; Pescatore, 2007).

Lack of enough empirical data regarding the students' critical thinking and its approach to language education shows the necessity for this study. Such a study can provide some useful information about the teaching of Critical Thinking and EFL in general and academic writing skills in particular. Conducting such a study can be significant for the following reasons:

- Firstly, although research on the students' critical thinking has been underway in other countries such as the United States and Europe, no study has been conducted so far on the undergraduate students' critical thinking in Iran. Thus, this study can provide an impetus for the teaching profession to follow a systematic approach to developing a critical thinking pedagogy in language education.
- Secondly, even though much research has been done on critical thinking approach to learning, very little is known about its effect on the students' academic writing abilities. Moreover, although the effect of critical thinking on general education has been indicated, it is unclear whether its effect will be repeated when critical thinking strategy is applied to different subject areas. This study can help language educators and curriculum designers understand the fact that critical thinking could be the basis for designing programs and course materials that can boost the students' learning.

Therefore, this study intends to answer the following questions:

1. Does explicit critical thinking strategy instruction help Iranian students outperform in their writing ability?
2. Do Iranian students who receive explicit instruction in critical thinking techniques have different dispositions toward the use of essential skills of thinking compared to those not receiving explicit instruction in essential techniques of thinking?

2. Literature Review

Critical Thinking (CT) is not a new term. The intellectual origins of CT can be traced back to about 2,400 years ago to Socrates' teaching practice who underlined the significance of questioning which is now called Socratic questioning, a strategy for teaching CT (Paul, 1985). Socrates set the agenda for CT tradition to reflectively question common beliefs and interpretations and carefully distinguish those beliefs that are rational from those that lack sufficient evidence or rational basis (Paul & Elder, 2008). Socrates' approach was followed by Plato, Aristotle and Greek skeptics who valued the significance of seeing through the chimerical appearance of the deeper realities of life. The CT tradition lasted for centuries until the CT movement in the early 1980s, when CT research in philosophy, psychology, and education broke out (Fasko, 2003).

The approaches used to define CT in philosophy, psychology, and education are different (see Table 1). The philosophical approach focuses on the application of formal rules of logic (Lewis & Smith, 1993) and emphasizes the quality and standards of thinking. It assumes the best performance of ideas that might not be in line with reality (Sternberg, 1986).

Table 1. Definitions of CT in Philosophy, Psychology and Education

Philosophy	Psychology	Education
Act persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends. (Dewey, 1933, p. 9)	The extension of evidence in accord with that evidence so as to fill up gaps in the evidence. (Bartlett, 1958, p. 75)	Analysis, synthesis, and evaluation. (Bloom, 1956)
The propensity and skill to engage in an activity with reflective skepticism. (McPeck, 1981, p. 8)	An active process involving a number of denotable mental operations such as induction, deduction, reasoning, sequencing, classification and definition of relationships. (Siegel, 1988, p. 118)	An investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that can therefore be convincingly justified. (Kurfiss, 1988, p. 2)
Reasonable reflective thinking that is focused on deciding what to believe or do. (Ennis, 1985, p. 45)	The mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts. (Sternberg, 1986, p. 3)	Making reasoned judgements. (Beyer, 1995, p. 8)

- Skillful, responsible thinking that facilitates good judgement because it 1) relies upon criteria, 2) is self-correcting, and 3) is sensitive to context. (Lipman, 1988, p. 39)
- Purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or conceptual considerations upon which that judgement is based. (Facione, 1990, p. 3)
- Disciplined, self-directed thinking that exemplifies the perfections of thinking appropriate to a particular mode or domain of thought. (Paul, 1992, p. 9)
- A set of processes whereby people assemble, use and revise internal mental symbols. (Gilhooly, 1996, p. 1)
- The use of those cognitive skills or strategies that increase the probability of a desirable outcome. (Halpern, 1998, p. 450)
- Seeing both sides of an issue, being open to new evidence that disconfirms your ideas, reasoning dispassionately, demanding that claims be backed by evidence, deducing and inferring conclusions from available facts, solving problems, and so forth. (Willingham, 2008, p. 8)
- The propensity and skills to engage in activity with reflective skepticism focused on deciding what to believe or do. (Halonen, 1995, p. 76)
- Take new information and interrelate and/or rearrange and extend this information to achieve a purpose or find possible answers in perplexing situations. (Lewis & Smith, 1993, p. 136)
- Skills which enable individuals to solve problems for which they have no ready-made procedures or solutions. (Steele, 1997, p. 6)

2.1. CT Skills and CT Dispositions

Although there are differences in the three viewpoints about CT definition, there are some common points. Firstly, researchers tend to identify certain skills that are closely related to the concept of CT. Secondly, researchers believe that CT involves not only skills but also dispositions. It requires a further exploration of prevailing definitions to determine specific CT skills and CT dispositions and their relationships.

2.2. CT Skills

The common conceptualization of CT relates it to a set of cognitive skills. More precisely, CT skills are called higher-order cognitive skills (Halpern, 2007), which need a higher level of complexity of thinking skills. In order to more clearly explain the skills required for CT, researchers such as Bloom, Ennis, and Facione have invested considerable effort in providing the taxonomies of CT skills (see Table 2).

Although the number of skills and the ways of categorization of those skills are different, they provide us with a more tangible conceptualization of CT by presenting a list of skills involved in the abstract thinking process. These skills cannot only be taught, but they are also observable and assessable. If we have a bird's eye view of all these definitions and classifications, it is not difficult to find several skills that most researchers value highly, whether it is from philosophy, psychology or education.

These skills which are listed in the Table 3, involve making judgments or decisions, reasoning, evaluation and analysis. The claim that these are the most important CT skills may not be definite.

However, the agreement reached on these skills implies a generally accepted view that CT is a utilization of skills such as reasoning, evaluating, or analyzing in thinking which aims to enhance the quality of thinking in the judgment and problem solving process.

Table 2. Taxonomies of CT Skills

Bloom (1956)	Ennis (1985)	Facione (1990)
• Analysis • Synthesis • Evaluation	• Focusing on a question • Analyzing arguments • Asking and answering questions of clarificationion and/or challenge • Judging the credibility of a source • Observing and judging observation reports, criteria • Deducing and judging deductions • Inducing and judging inductions • Making value judgments • Defining terms, and judging definitions in three dimensions • Identifying assumptions • Deciding on an action • Interacting with others	• Interpretation • Analysis • Evaluation • Inference • Explanation • Self-Regulation

Table 3. Some Main CT Skills

Making judgement/decision	Ennis (1985, 1987); Facione (1990); Seifert (2010); Willingham (2007).
Reasoning	Ennis (1987); Facione (1990); Paul (1992); Stahl & Stahl (1991); Willingham (2007).
Evaluating	Bloom (1956); Facione (1990); Graham (2011); Siegel (1988).
Analyzing	Bloom (1956); Ennis (1987); Facione (1990); Paul (1992).

2.3. CT Dispositions

Along with the agreement on the idea that CT has a set of cognitive skills, researchers increasingly believe that CT also involves dispositions, which are, as defined by Facione (2000), "consistent internal motivations to act toward or respond to persons, events, or circumstances in habitual, yet potentially malleable ways" (p. 64). Delphi research experts warn that those who are proficient in CT skills but fail to use them properly are not good critical thinkers (Facione, 1990).

Dewey (1933) emphasized the importance of attitudes. He pointed out that people tend to believe the facts that are consistent with their desires because their personal attitudes have not been examined. He stated that if we are forced to make a choice between personal attributes and the knowledge of logical reasoning principles along with a certain degree of technical skill in manipulating particular logic processes, we should select the former. When it comes to CT teaching in the educational milieu, special emphasis is placed on the CT dispositions as necessary factors for understanding CT instruction and as the final aim of teaching CT (Facione, Facione, Sánchez and Gainen, 1995).

As Ennis (1985) shows, critical thinking ability is different from critical thinking disposition. Researchers from different fields of knowledge have attempted to describe the dispositions that an ideal critical thinker should have. Dewey (1933) proposed three personal attitudes. These three personal attitudes are a basic part of the general willingness to think in a thoughtful manner: wholeheartedness, open-mindedness, and responsibility.

Many other researchers (e.g. Ennis, 1987; Halpern, 1998) advocating for emphasis on CT dispositions also provide a list of CT dispositions. Just as in the case of CT skills, although there is no consensus on a comprehensive list of CT dispositions, several intellectual traits are of great

significance for being a critical thinker, such as open-mindedness, inquisitiveness, fair-mindedness, propensity to seek alternatives, and respect for reason (See Table 4).

Table 4. CT Dispositions

Open-mindedness	Bailin et al. (1999); Dewey (1933); Ennis (1987); Facione (1990); Halpern (1998).
Fair-mindedness	Bailin et al. (1999); Facione (1990).
Inquisitiveness	Bailin et al. (1999); Facione (1990).
Propensity to seek alternatives	Ennis (1987); Lipman (1988).
Respect for reason	Bailin et al. (1999).

Interestingly, it has been found that these prominent dispositions are to some extent overlapping in nature. For example, open-mindedness, as defined by Dewey (1933), is "freedom from prejudice, partisanship, and such other habits as close the mind and make it unwilling to consider new problems and entertain new ideas" (p. 30). It expresses a meaning of fairness. Paul and Elder (2001) define it as unbiased and unprejudiced. Dewey also stated that open mindedness also includes actively listening to multiple opinions, paying attention to other possibilities, and recognizing the possibility of mistakes in one's beliefs, as well as alertness to the spontaneous outreaching for new things. In this sense, it also includes a disposition to seek alternatives and curiosity. Nonetheless, this does not mean that critical thinking dispositions come down to open-mindedness, because it does not encompass all the virtues that critical thinkers should possess. It can be concluded from all these arguments that the essence of being a critical thinker does not mean being rigorous, but rather being aware of the possible mistakes an individual might make, of the diversity of possible solutions, and the ways to achieve fair results.

Considering that disposition is an important part of CT, this shows the fact that CT should be seen as not just a set of thinking skills, but should also recognize why and how to use these skills and the willingness of using them where appropriate. This recognition reminds us that, on the one hand, CT arises only when people use it; on the other hand, the key and important goal of CT teaching is to encourage students' CT dispositions.

2.4. The Relationship Between CT Skills and CT Dispositions

A glance at the definitions of CT identifies two basic aspects of CT and reveals that a thorough understanding of CT should include skills and disposition. Facione et al. (1995) assume that CT skills and CT disposition reciprocally reinforce each other. However, the connection between CT skills and CT dispositions is not a one-to-one correspondence, which means that skills-centered courses do not lead to learners willing to think critically, because being skilled does not guarantee that someone is using CT, and having disposition toward critical thinking does not guarantee that the person is skilled (Facione, 2000).

The relationship between CT skills and CT dispositions reveals two principles about what and how to teach CT. First of all, the teaching of CT involves not only the development of CT skills but also the cultivation of CT dispositions, so that learners can not only use CT skills in an appropriate setting, but also are willing to use CT skills. Second, although the teaching of CT skills and CT disposition should not be separated, skills and dispositions are two distinct things (Facione, 2000). Hence, different approaches should be used for each aspect.

An investigation of the perception of CT shows the complexity of the concept, which implies possible challenges to introduce CT into the classroom context. With regard to the actual teaching practice, what teachers want is more than one definition, but an established model that can present a set of tools to facilitate the teaching and learning of CT in different disciplines (Jones & Haydon, 2012).

Table 5. Paul and Elder's (2001) CT Model

Elements of thought	Intellectual standards	Intellectual traits
□ Purpose	□ Clarity	□ Fair-mindedness
□ Question at issue	□ Accuracy	□ Intellectual humility
□ Information	□ Precision	□ Intellectual courage
□ Interpretation and inference	□ Relevance	□ Intellectual empathy
□ Concepts	□ Depth	□ Intellectual integrity
□ Assumptions	□ Breadth	□ Intellectual perseverance
□ Implications and consequences	□ Logic	□ Confidence in reason
□ Point of view	□ Significance	□ Intellectual autonomy
	□ Fairness	

Considering CT as the art of analyzing and evaluating thinking with regard to its improvement (Paul & Elder, 2007), Paul and the Elder presented a 3D model of CT that includes not only CT skills and CT dispositions, but also standards which evaluate the quality of thinking. They believe that critical thinkers regularly use intellectual standards for the elements of reasoning to develop intellectual traits (Paul and Elder, 2001), Paul and the Elder provided three components in their CT model (Table 5): (1) elements of thought; (ii) intellectual standards; and 3) Intellectual traits.

2.5. The Significance of Learning CT

Each of us needs critical thinking skills and dispositions when it comes to solving problems and making decisions that affect our lives, our families, our country, and our world. Learning requires the power of critical thinking because when it comes to new situations, problem conditions, and opportunities for innovation, learning requires the interpretation and integration of new knowledge, as well as its practical and appropriate application. According to Bloom (1956), the key to seeing critical thinking in the academic world is to understand the importance of critical thinking in learning. Excellent teachers develop critical thinking at every stage of learning, including initial learning. The key is to train critical thinking teachers to stimulate students' thinking skills by asking questions that inspire ideas that are crucial to the construction of knowledge.

According to Nummela and Rosengren (1986), when the natural tendency of the brain to make meaning from patterns is used in teaching, learning becomes more similar to learning in real life. Because the brain creates patterns, the teacher's task is to organize and present the material and let the brain create meaningful and pertinent connections to extract the patterns. This type of learning is the most easily recognized as a whole, and these methods aim to establish a connection between meanings via creating problem-solving ability and fostering critical thinking skills.

Critical thinking is of great significance for it makes use of parts of the brain that we rarely use. Critical thinking makes us more alert and helps us solve problems. By combining imagination and intuition with reasoning and assessment, learners can achieve perspectives, construct and identify relationships, and improve their understanding. They have the confidence to process data, use the latest sources of information, analyze arguments and solve complicated problems. This occurs if and only if critical thinking is part of the student's classroom activities (Powell and Tassoni, 2009). They also elucidate that critical thinking and understanding context in an attractive learning situation leads to thinking and informed action. Making a well-thought decision and checking its consequences heightens one's moral commitment, enriches ethical understanding, and reinforces civic participation.

Maimon, Peritz, and Yancey (2008) explain that critical thinking is not only the basis of university work but also the foundation of democratic social life. Critical thinking means being involved rather than necessarily finding fault. Critical thinkers never merely collect information and present it without question. They ask about what they see, hear, and read. They involve the

following skills: cognitive argumentation; analysis and assessment of an argument; and recognition of common logical fallacies. There are many positive and advantageous uses of critical thinking, for example, developing feasible solutions to complicated personal problems, considering what actions to take as a group, or analyzing the assumptions and value of the methods utilized in scientifically reaching an acceptable level of confidence about a specific hypothesis (Sumner, 1906). According to Sumner (1906), through strong critical thinking, we can assess an argument, for example, as worthy of acceptance since it is based on a true premise. Through reflection, a speaker might be regarded as a reliable of information on a particular subject matter.

2.6. Theoretical Underpinnings of CT Instruction

In this study, a constructivist learning approach to learning has been considered to be the key theoretical standpoint underpinning critical thinking teaching and learning. Constructivism is a philosophy of education which is characterized by students' ownership of the learning process. Learning critical thinking is best done through constructivism (Leach, 2011). Brooks and Brooks (1993) see constructivism as a philosophy leading to critical thinking. Constructivist learning theory holds that knowledge is constructed from learners' perceptions, experience, and mental representations. Meaning is created by individuals and depends on their personal prior and present knowledge structure (Wadsworth, 1971). Learning is a personal experience built on a scaffold of experience which changes when experience is gained. Experience enhances the deep understanding of content (Healy, 1990). Positive interactions and personal relationships within the classroom build an environment contributing to higher-order thinking (Healy, 1990). Critical thinking requires students not only to vigorously participate in the content presented, but also with other people involved.

Although there is a need to improve critical thinking skills in all areas of education, teaching methods can stimulate responses on a lower level of Bloom's taxonomy (Elder and Paul, 2009). Rote memorization is common in most classrooms and is the main approach to learning materials. According to Brookfield (2006), this passive activity is on a lower level of learning. In contrast, constructivist classrooms tend to be more stimulating, challenging, attractive, and interesting. Marzano (2007) pointed out that constructivist teachers are not passive observers. They provide discussion, challenges, and act as promoters to encourage learners to question knowledge. Teachers must allow students to build their own knowledge (Brooks and Brooks, 1993).

Constructivist teachers are not seen as those who transfer knowledge to their students, but are seen as coordinating individuals on the personal level who pave the way for the ownership of knowledge. Constructivist teachers do not consider that students can repeat verbatim, but they can produce, present, display, and build content (Brooks and Brooks, 1993). Content knowledge should be taught via the integration of critical thinking, or as Jenkins (2009) mentioned, this process should teach students to think. Engaging the brain through critical thinking and problem solving is more advantageous than the rote memorization of pieces of information (Matheny, 2009). As Lewis and Smith (1993) put it, mature brains help solve problems and higher-order thinking.

The necessity to teach content is an important hurdle to the teaching of critical thinking skills. Other obstacles to the application of critical thinking include the size of the classroom, classroom time, and teacher attitude (Slavin, 2009). Traditional educational concepts as teachers being considered as the information transmitters and students as passive recipients of knowledge seriously hinder the development of critical thinking skills (Marzano, 2007). This teaching philosophy is best described as essentialism. Essentialism has replaced progressivism, the educational philosophy advocated by Dewey (1933) in the early 20th century.

Progressivism is considered to be an educational philosophy that promotes critical thinking. In the progressivist classrooms, students are stimulated to communicate with one another, and social merits such as collaboration and tolerance for different viewpoints are developed (Sadker and Sadker, 2003). Teachers in progressivist classrooms integrate content from different topics and plan lessons to provoke inquisitiveness and higher levels of knowledge.

Essentialist teachers and managers, on the other hand, decide what is important for students to learn and put little emphasis on their interest (Sadker and Sadker, 2003). As a means of assessing progress, essentialist teachers mostly focus on achievement scores (Sadker & Sadker, 2003).

3. Method

3.1. Research Design

This research study is a 2-group quasi-experimental pretest/posttest control group design. Students were assigned to experimental and control groups. A quasi-experimental pretest/posttest control group design was utilized for this study to determine whether students receiving the critical thinking instruction would perform differently from those in the non-critical thinking group.

3.2. Participants

The current study was carried out in Jahrom University of Medical Sciences, Iran. 140 students participated in this study. They were male and female students studying advanced English writing course at Jahrom University of Medical Sciences. They were from 18 to 25 years of age. The students were selected using convenient (purposive) sampling technique. They were divided into experimental (critical thinking) and control (non-critical thinking) groups.

3.3. Instruments

The instruments that were used in this study are as follows:

a) The Researcher-developed Essay Test

An essay writing test was developed to examine whether students who are exposed to explicit instruction in critical thinking perform better in a test that requires them to analyze and interpret topics and write essays than those who do not receive explicit instruction in critical thinking. It is assumed that such a writing test is more comprehensive and can evaluate more aspects of critical thinking. For this purpose, a topic is assigned, and students are required to write so that the researcher can examine whether explicit instruction in critical thinking in the writing course can enhance the students' performance in essay writing skills. Because of the subjective nature of marking an essay, inter-rater reliability can be an inevitable problem. Therefore, the reliability of the essay writing skill test must be measured to make sure that coders assign the essay test ratings consistently.

b) The Ennis-Weir Critical Thinking Essay Test

The second instrument used in this study was the Ennis-Weir Critical Thinking Essay Test (CTET) developed by Ennis and Weir (1985). Although there are several instruments which test critical thinking abilities, this instrument is the most significant instrument for teaching and testing purposes (Ennis & Weir, 1985). It is an open-ended test because critical thinking is an open-ended activity (Ennis & Weir, 1985) that can help evaluate an individual's general ability to assess an argument and to make an argument in response. The reliability of the Ennis-Weir CTET has been calculated to be from 0.72 to 0.99 (Ennis, 2005).

c) The California Critical Thinking Dispositions Inventory (CCTDI)

The third instrument used in this study was the California Critical Thinking Dispositions Inventory (CCTDI). The aim of this instrument was to determine whether the students who receive explicit instruction in critical thinking strategies have different dispositions towards their critical thinking abilities compared to those who do not receive any instruction. This is the first instrument which has been devised for this purpose, and it is conceptually rooted in the Delphi Report on Critical Thinking (American Philosophical Association, 1990). This inventory has seven dimensions and 75 items with a Likert scale type. The seven dimensions of this instrument are systematicity, open-mindedness, analyticity, truth-seeking, inquisitiveness, critical thinking, self-confidence, and cognitive maturity.

3.4. Data Collection

Students were assigned to the control and the experimental groups. The CCTDI, the academic writing test, and the Ennis-Weir Critical Thinking Essay were used to collect data in two phases (pretest and posttest). The students in the experimental and the control groups received instruction in academic writing 3 hours per week for one semester. The instructor gave the students a pretest at the end of the first week of instruction. The instruction then continued for 15 weeks.

3.5. Instructional Method and Materials

3.5.1. Experimental Group

In order to examine the possible impacts of incorporating explicit instruction of critical thinking into academic writing curriculum on Iranian university students' writing performance, students were assigned to experimental and control groups. The APA Delphi Report on Teaching for Critical Thinking and Assessment (Facione, 1990) was utilized as the basis for the experimental treatment in the present study. The instructor integrated the critical thinking techniques into the content of academic writing course in the experimental group via (a) providing CT explicit instruction, (b) teaching students how to make use of those techniques to synthesize, analyze, and evaluate texts, (c) presenting support materials in CT classrooms (including leaflets, models) of the instructional techniques, (d) leading Socratic discussions based on the elements and criteria suggested in the instructional techniques, (e) assigning classroom activities and giving them adequate time to practice each skill, using both oral and written techniques, and assessing students' performance.

Students used two academic EFL writing materials (Table 6). One of these materials, nevertheless, was revised by the instructor to be used in the experimental group. Classroom assignments for the two groups were the same except integrating CT activities into classroom writing assignments explicitly to the experimental group.

The instructor provided the students in the experimental group with a package of critical thinking skills and explained to them. It included the definition of CT and CT skills, efficient techniques for developing critical thinking skills and habits of mind, and Critical Thinking Classroom Support. The instructor helped them create critical thinking skills to have a better performance in their academic and in everyday life situations. The package from which students could select a strategy to use in a specific situation was borrowed from Paul's model and was taught to students in the experimental group. The package included CT skills and abilities (i.e. evaluation, analysis, explanation, inference, interpretation, and self-regulation (exceptional to Delphi Report)), the basics of reasoning: the goal of thinking, the problem to be solved, concepts and principles, information, frame of reference, perspective, inferences and solutions, assumptions and implications.

The instructor focused on critical thinking strategies in the experimental group. Firstly, the instructor utilized scaffolded specific strategies of CT which commenced with rudimentary questioning strategies and ended with higher-order CT skills. He told the students that successful academic writing requires evaluation of information and the author's tone, data analysis, paraphrasing, and summarizing. Academic writers are expected to express their own points of view on the issue after summarizing the information. The students were asked to use elements of reasoning when reading texts and they were encouraged to share views about the text.

This collaborative activity helped them better comprehend what types of reasoning were expected of them and improve their understanding of academic writing skills. In the experimental class, besides having Socratic discussions on the specified issues, the students were required to give a *lecture* for approximately 10-15 minutes. In order to enhance the students' critical thinking and academic writing ability, the instructor adopted a comprehensive explicit teaching method, with the following textbooks and other supplementary reading materials:

Textbooks:

1. Teaching Academic ESL Writing: Practical Techniques in Vocabulary and Grammar (Hinkel, 2003), and

2. The Write Stuff: Thinking Through Essays (Sims, 2014).

3.5.2. The Control Group

Students in the control group were taught the same academic writing course materials as the experimental group. However, the two groups followed different instructional approaches for evaluating and analyzing the materials. Instead of teaching students to use the reasoning skills to analyze sources, the instructor asked the students in the control group to complete the questions at the beginning and at end of the sources. However, in order to be able to answer all the questions, students needed to use the elements of reasoning and use academic writers' strategies for comprehending sources in academic articles. The crucial differences between the approaches used in the control group and in the experimental group were the explicitness of CT instruction i n the experimental group. The instructor attempted to use the same activities in both groups except for the materials of CT instruction. The instruction time was the same both groups.

Students in both the experimental and the control groups were given the same topic and required to write about it as a post-instruction test. Then, the Ennis-Weir CTET and the CCTDI were administered to them. Having coded and marked the tests data, the researcher analyzed the data using appropriate statistical procedures.

3.6. Data Analysis

The means and standard deviations for the three instruments, namely Academic Writing Skills Test (AWST), Ennis-Weir Critical Thinking Essay Test, and the CCTDI are presented in Table 4. There were 73 students in the experimental group and 67 students in the control group.

Table 4. Descriptive Statistics of the Pretest and the Posttest Scores of the Instruments

Instrument	Experimental Group (n = 73)				Control Group (n = 67)			
	Pretest		Posttest		Pretest		Posttest	
	Mean	SD	Mean	SD	Mean	SD	Mea	SD.
AWST	51.32	13.72	74.68	5.92	51.63	7.58	56.49	12.17
Ennis-Weir	43.57	7.04	71.42	6.84	44.32	5.72	53.78	7.96
CCTDI (Total)	279.58	29.87	316.38	26.42	278.12	23.85	292.82	13.87

The results of the descriptive statistics as indicated in Table 4 show that the mean pretest of the experimental group is approximately the same as the mean pretest scores found in the control group, demonstrating that the two groups had similar background before the intervention. Nevertheless, there was a significant difference between the experimental and the control groups regarding the pretest and the posttest scores. The experimental group had a higher gain on all instruments on the posttest compared to the control group which had a trivial change from pretest to posttest.

3.6.1. Impact of Explicit Instruction in Critical Thinking on Student's Writing Performance

In order to explore the impact of CT explicit instruction on students' writing performance, an independent-samples t-test was run. The significance level was set at $P < 0.05$. Table 5 provides the result of the t-test.

Table 5. The independent-samples t-test for the experimental and the control groups regarding essay writing

	Group	N	Mean	SD	SE mean	t-value	df	P (sig.2-tailed)
Posttest	E	73	77.68	5.92	1.17932	7.147	138	.001*
	C	67	56.49	12.1	1.71634			

Significant at $p < 0.05$ (2-tailed)

According to Table 5, there was a statistically significant difference between the experimental group and the control group with regard to their writing performance ($P < 0.05$). The mean of the experimental group was significantly higher ($M = 77.68$, $SD = 5.92$) compared to that of the control group ($M = 56.49$, $SD = 12.1$). The effect size of the difference in the academic writing skills test was calculated at Cohen's $d = 1.67$, demonstrating a very large effect size.

3.6.2. The Impact of CT Explicit Instruction on Students' Dispositions Toward CT

Table 6 provides the results of descriptive statistics on the CCTDI. According to Table 6, there was a trivial difference between the mean pretest of the experimental group ($m = 279.58$) and that of the control group ($m = 278.12$). Nonetheless, the gains at the posttest in both groups were higher than those of the pretest. According to Table 6, the experimental group had a more remarkable improvement from pretest to posttest, though students' gains in both groups had an increase from pretest to posttest.

Table 6. Descriptive Statistics of the Experimental and the Control Groups on the CCTDI

			Pretest Scores		**Posttest Scores**	
Instrument	**Group**	**N**	**Mean**	**SD**	**Mean**	**SD**
CCTDI (Total)	Experimental	73	279.58	29.87	316.38	26.42
	Control	67	278.12	23.85	292.82	13.87

In order to examine whether the mean of the two groups were significantly different in posttest due to instruction or not, an independent-samples t-test was used. Table 7 provides the results of the t-test.

According to Table 7, there was a statistically significant difference between the total mean of the experimental (E) and the control (C) groups (total mean of $E = 318.38$, $SD = 24.1225$; total mean of $C = 290.82$, $SD = 15.3267$). There was not any statistically significant difference in the mean posttest scores on some CCTDI subscales (for example, *truth-seeking*, *cognitive maturity, and open- mindedness*), whereas the mean posttest scores of some CCTDI subscales were significantly different (for example, *analyticity, CT inquisitiveness, CT self-confidence, and systematicity*). The mean posttest scores of the experimental group were significantly higher on Systematicity ($M = 50.1794$, $SD = 5.4632$), Analyticity ($M = 45.4789$, $SD = 6.3685$), CT Self-Confidence ($M = 43.7419$, $SD = 3.4123$), and CT Inquisitiveness ($M = 48.3263$, $SD = 5.6514$) than the mean posttest scores of the control group, for instance, Analyticity ($M = 40.2179$, $SD = 4.9725$), Systematicity ($M = 43.7317$, $SD = 5.4971$), CT Self-Confidence ($M = 38.9412$, $SD = 5.3497$), and CT Inquisitiveness ($M = 43.0179$, $SD = .7649$).

Table 7. Independent-Samples t-test for Students' Dispositions Toward Critical Thinking

Sub-scales	Group	N	Mean	SD	SE Mean	t-value	df	Sig.2-tailed
Truth-seeking	E	73	45.2145	8.2136	1.4712	1.627	138	.231
	C	67	44.3697	6.1637	.9147			
Open-mindedness	E	73	43.4153	5.4791	.8994	1.598	138	.219
	C	67	42.3265	4.8749	.9461			
Analyticity	E	73	45.4789	6.3685	.7498	3.712	138	.003*
	C	67	40.2179	4.9725	.8124			
Systematicity	E	73	50.1794	5.4632	.7364	5.212	138	.000*
	C	67	43.7317	5.4971	.7968			
CT Self-Confidence	E	73	43.7419	3.4123	.7146	4.897	138	.000*
	C	67	38.9412	5.3497	.8794			
CT Inquisitiveness	E	73	48.3263	5.6514	.8971	3.964	138	.002*
	C	67	43.0179	5.0912	.7649			
Cognitive Maturity	E	73	42.0298	5.6973	.8103	.325	138	.697
	C	67	42.2174	5.5897	.7984			
CCTDI Total Score	E	73	318.38	24.1225	3.7891	4.412	138	.000*
	C	67	290.82	15.3267	2.9148			

*Significant at $p < 0.05$ (2-tailed)

4. Discussion

The purpose of the first question was to investigate whether explicit instruction in CT results in improved performance of Iranian students' academic writing skills. In other words, the aim of this question was to know whether students who receive explicit instruction in CT strategies would perform better on a test which requires them to write, interpret, and analyze an argumentative essay compared to their counterparts who do not receive any explicit instruction in CT techniques. In order to answer this question, the researcher incorporated the critical thinking techniques into the curriculum for the experimental group students through giving them critical

thinking assignments and activities. To examine the impact of the instruction, students in both groups were given an argumentation essay writing test to advance an argument or claim about a topic and they were required to provide valid reasons and supporting evidence to convince readers to agree with their stance. The scores they obtained on the essay test were regarded as data for deciding whether students who received instruction outperformed in thinking and writing critically compared to their counterparts who did not receive any instruction. Then, the data were analyzed through descriptive statistics and an independent-samples t-test. The magnitude of the difference between the mean scores of the two groups (mean = 74.68 experimental, 51.32 control) showed that the CT instruction had a statistically significant effect on students' writing performance. The difference was statistically significant $P < 0.05$ (2-taild) and the effect size was very large (Cohen d=1.67).

This finding is in line with the finding of a study conducted by Chaffee, McMahon, and Stout (2002). Worrell and Profetto-McGrath (2007) maintained that using critical thinking strategies with different levels of language ability in English language classes can improve students' level of thinking and, at the same time, can help language learners better their speaking, listening, reading and writing abilities. Lipman (2003) believes that critical thinking techniques can provide learners with instruments which assist them to surpass the linguistic elements and to foster the art of learning another language. Studies have indicated that critical thinking in writing enhances the learning experience and makes the language learning more meaningful for the learners. Critical thinking is a vehicle through which learners can discover themselves gradually during the language learning process (Lipman, 2003).

The findings of the present study indicated that a critical thinking approach to learning could be an effective intervention to improve students' essay writing abilities. Mirman and Tishman (1988) state that critical thinking skills entrenched in the curriculum and intertwined in language education can directly bring about learning a language better. The findings of a qualitative also indicated the relationship between CT skills and academic writing abilities (Bereiter and Scardamalia,1985).

One aspect of critical thinking which is an integral component of various models including Paul's model is an individual's dispositions toward using critical thinking. Although an individual might have skills necessary for good reasoning, he or she might not use them. The second research question investigated whether or not students who received CT instruction demonstrated any improvement in their dispositions toward critical thinking during the semester.

Students in both groups were administered the California Critical Thinking Dispositions Inventory (CCTDI) both at pre-and-post-instructions of the course in order to determine their dispositions toward critical thinking. No difference was observed between the two groups at the pretest of the experiment. The posttest means of the experimental group, however, were significantly different from those of the control group on the CCTDI scores, indicating the impact of CT instruction on students' CT dispositions toward using them.

Although an overall improvement was observed in critical thinking dispositions at the posttest, the mean posttest scores on some subscales of CCTDI (for example, *cognitive maturity, open- mindedness, and truth-seeking*), did not show any significant difference. This similarity in mean scores in this study shows that exposure to the educational experience, whether through CT explicit instruction, or through traditional teaching method does not seem to have made these students learn truth-seeking, open-mindedness, and cognitive maturity. Findings of this present study indicated that there was a statistically significant difference in CCTDI between experimental and control groups. This finding is in contrast with Reed's (1998) finding that showed no statistically significant difference between the pretest and posttest overall CCTDI scores.

On the other hand, the mean posttest scores on some subscales of CCTDI (for example, Systematicity, Analyticity, CT Inquisitiveness, and Critical Thinking Self-confidence) were significantly different between the experimental and control groups. This finding is in line with

Tiwari's (1998) finding that showed a significant difference for these dispositions except *CT inquisitiveness*. It is also consistent with that of Taha (2003) who found statistically significant differences in these CCTDI subscales except *CT self-confidence.*

Some studies have shown that *truth-seeking* the most difficult disposition to develop (Rimiene, 2002) and ambivalence about truth-seeking is so common (Profetto-McGrath et al, 2003). Duchscher (2003) conducted a qualitative study to investigate how nurses perceived critical thinking. She found that the use of reasoning skills is not evident in practice, and it might even be in conflict with professional socialization. Qualitative findings identified some barriers to critical thinking such as hierarchy, traditional thought, culture, and lack of confidence to question. Other barriers include personal, professional and political risk associated with critical thinking and issues related to power relations. These findings resonate with Brookfield's (1993) study on suicide. Profetto-McGrath et al (2003) found that research appraisal skills can bring about the development of critical thinking dispositions. A possible reason why some dispositional aspect of CT did not increase significantly might be that those aspects were not the focus of instruction as other aspects. Therefore, a change might be observed if more time is allocated for teaching that aspect of critical thinking dispositions. Lai (2011) believes that cognitive maturity is closely related to developmental growth and improves through time.

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