

**THE RELATIONSHIP
BETWEEN PROFICIENCY IN A FOREIGN LANGUAGE AND CRITICAL
THINKING SKILLS**

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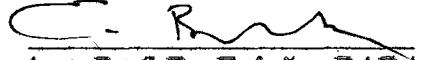
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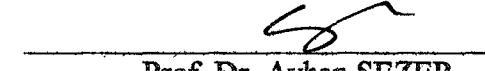
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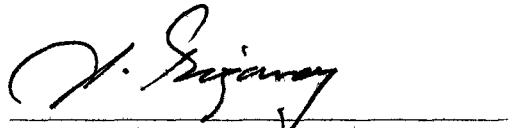
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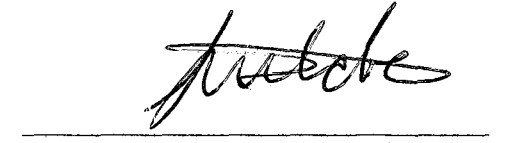
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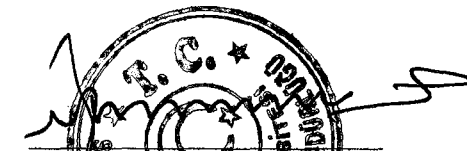

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I think—therefore I am.

-René Descartes

I think that I think, therefore I think I am. –Ambrose Bierce

DEDICATION

This dissertation is dedicated to my husband, Samim Mirioğlu.

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ÖZET**YABANCI BİR DİLDE YETERLİLİK VE ELEŞTİREL DÜŞÜNME
ARASINDAKİ İLİŞKİ****Meryem MİRİOĞLU (AKÇAYOĞLU)****Doktora tezi, İngiliz Dili Ana Bilim Dalı****Danışman: Yrd. Doç. Dr. Erdoğan BADA****Aralık 2002, 144 Sayfa**

Bu çalışmanın başlıca amacı yabancı bir dilde yeterlilik ile eleştirel düşünme arasındaki ilişkiyi araştırmak ve buna bağlı olarak yabancı dil öğrenme sürecinde bireylerin başvurdukları öğrenme stratejileri ve bu stratejilerin eleştirel düşünme üzerindeki etkisini vurgulamaktır. Çıkarım, hipotez test etme, sonuç çıkarma, vb. yabancı dil öğrenme stratejileri, eleştirel düşünmenin özellikleri arasında yer almaktadır.

Bu stratejilerin etkin bir biçimde kullanımları hem yabancı dil öğrenimine, hem de eleştirel düşünme becerilerine katkıda bulunabilir. Yabancı dil öğrenme sürecinde birey, bilişsel stratejilere başvurur. Yabancı dil öğrenmek, bireylerin eleştirel düşünme becerilerini artırabilir.

Bu araştırmada, bireylerin yabancı dil düzeyleri arttıkça buna paralel olarak eleştirel düşünme becerilerinin de arttığı görülmüştür. Bu çalışma sonucunda yabancı dilin eleştirel düşünmeye olan önemli etkisinin yanı sıra bireylerin sosyo-ekonomik durumlarının da eleştirel düşünme üzerinde etkili olduğu gözlenmiştir.

Anahtar Kelimeler:

Eleştirel Düşünme, Eleştirel Düşünme Becerileri, Yabancı Dil Düzeyi, Yabancı Dil Öğrenme Stratejileri

ABSTRACT**THE RELATIONSHIP BETWEEN PROFICIENCY IN A FOREIGN
LANGUAGE AND CRITICAL THINKING SKILLS****Meryem MİRİOĞLU (AKÇAYOĞLU)****Ph. D. Dissertation, English Language Teaching Department****Supervisor: Asst. Prof. Dr. Erdoğan BADA****December, 2002, 144 Pages**

The present study focuses mainly on the relationship between proficiency in a foreign language and critical thinking skills. In the Adult Second Language learning process, individuals utilize various language learning strategies, for example inferencing, hypothesis testing, deducting, etc., which correspond to the characteristics of critical thinking.

The effective use of these language strategies may contribute to success in language learning as well as critical thinking skills. During the process of second language learning, the learner is engaged in cognitive strategies. This experience of learning a second language may result in an increase of critical thinking ability of second language learners.

Our findings indicate that a relationship between language proficiency and critical thinking is existent. Besides language proficiency, family background was found to have an impact on critical thinking skills.

Key words:

Critical Thinking Skills, Second Language Proficiency Level, Second Language Learning Strategies

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LIST OF ABBREVIATIONS

AG.....	Advanced Group
CT.....	Critical Thinking
ELT.....	English Language Teaching
FBG.....	False Beginners Group
IG.....	Intermediate Group
L2.....	Second Language
LLS.....	Language Learning Strategies
MTELP.....	Michigan Test of English Language Proficiency
PSBQ.....	Personal Background Information Questionnaire
PSTE.....	Primary School Teacher Education
SES.....	Socio- Economic Status
SLA.....	Second Language Acquisition
WGCTA.....	Watson-Glaser Critical Thinking Appraisal

CHAPTER I

INTRODUCTION

1.1 Background of the study

Taking Paul's (1990) belief that the art of critical thinking will be a survival need in the 21st century as basis, most scholars in the domain of education, undoubtedly, accept this century as the era of using and analyzing the knowledge in a critical way. What is critical thinking (or critical mindedness)? According to Paul (1994, p.3), "critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information which is generated by observation, reflection, experience, reasoning, or communication as a guide to belief and action". The purpose of critical thinking, according to Beyer (1995), is to "ascertain the degree to which some phenomenon meets some criterion or the extent to which it is an authentic instance of a specifically defined phenomenon" (1995, p.8).

Therefore, there has been a growing awareness in the recent years that children must be prepared particularly for critical thinking, or *higher order thinking*, that is required for the base of any action, development, behavior, invention, and novelty. This preparation entails fundamental changes in the whole education infrastructure. For this very reason, if the change is an inevitable phenomenon, we must, then, really consider about curriculum, methods, techniques, textbooks, and attitudes of teachers in our present

education system. In other words, fostering students' ability to think critically at all levels should be one of the primary targets of education.

Today, many teachers in all over the world foster thinking in their classrooms; but teaching thinking is a difficult task and requires a great deal of co-operation with other teachers, energy, organization, and patience. No matter how hard it is to achieve, " the time has come to seriously consider thinking as a major goal for teaching and learning at all levels of education" (Presseisen, 1986, p.5).

By the same token, when educating the teachers of the future generation, special attention should be given to improve their ability to *think critically*, to communicate effectively, to reason, to use judgments in an effective manner and to solve problems. Students of today and tomorrow will be expected to perform higher –level skills of thinking so as to make the necessary decisions to be able to cope in a rapidly changing world. Therefore, the focus of education must be on teaching appropriate skills for dealing with the future (Eggers, 1981).

Now that future's dynamic society requires that individuals be equipped with *higher order thinking skills*, the term should be defined from every angle. What distinguishes higher order thinking from other forms of thought is that lower order thinking simply demands routine, mechanistic application of knowledge acquired previously. For example, exercises of repetitive type such as inserting numbers into formulae or listing information previously memorized. On the other hand, higher order thinking requires the student to interpret, analyze, or manipulate information when faced with a question or a

problem that is too intricate to solve through routine application of knowledge previously learned (Newmann, 1990a). Being aware of this situation, today, there is a clear interest in fostering *higher order* thinking skills in college level education in western society (Baker and Andersen, 1983; Cross, 1990; Costa, 1992). On the other hand, as mentioned before, it needs to be taught across the curriculum (Astin, 1992).

Implementation of such a curriculum will probably help materialize everyone's goal of excellence in education as students, parents, society, and the government are constantly looking for ways and means to enhance the level of academic achievement, whether of their own, their children or the citizens. This type of idealized education system will fill the gap that educators have recently begun to notice in the higher order thinking strategies of high academic achievers who have no problems getting straight A's in their exams and gaining entrance into universities.

Among these high academic achievers, the gap the educators refer to is relevant with the lack of the ability to creatively seek new solutions to address the ever-changing problems that one encounters daily. According to a report published by American National Institute of Education (NIE)(1984), to improve undergraduate education, it is recommended that the curriculum should ensure "the development of capacities of analysis, problem solving, communication and synthesis" (p.43). In the same report it is emphasized that a college education should accommodate students with skills to adapt to a changing world in which they are required to "think critically and to synthesize large quantities of information" (p.43). It is also recommended that college administrators and

faculties tailor programs that would allow students to attain these skills (in McMillan, 1987).

Similarly, Brookfield (1995a), among others, agrees that critical thinking is an important criterion of intellectual and academic achievement and claims that it has been an acknowledged goal in higher education and is broadly considered to be an indispensable characteristic of the citizen in a democracy (Browne and Litwin, 1987). They assume that critical thinking is not merely a cognitive skill but is a form of practice and commitment (Brookfield, 1995a). Within the same line of reasoning, Gadzella et al. (1997) put forward that, for students, critical thinking should form an indispensable part in their study. Practiced as a way of learning, critical thinking appears to be contributing to academic achievement. Thus, one of the primary goals in this form of education is to assist students in developing and enhancing effective critical thinking skills (McMillan, 1987; Paul, 1993; National Institute of Education, 1984; McBride and Reed, 1998).

1.2 Statement of the problem

In our present education system, most teachers do not seem to be equipped with the necessary skills to educate and prepare future generations for the twenty-first century, the era of knowledge. In order to help our students to compete with the citizens of other developed countries in the field of knowledge and advanced technology, they must be properly educated to fully utilize higher order thinking skills and hence become critical thinkers. Unfortunately, in our education system in Turkey, memorization and rote learning is overemphasized leading the students to simply to answer test items aimed at preparing them for important tests, such as university entrance exam.

Although we know that critical thinking is more important than rote memorization, not many teachers tend to teach critical thinking skills in their classes. As a result, our students lack learning the skills of questioning, researching, analyzing, interpreting and the like since we do not teach them how to process information. Instead, we teach them factual information, which many students find irrelevant and meaningless (Good & Brophy, 1994). Therefore, they do not become critical thinkers.

The use of the components of critical thinking skill module is applicable in generating solutions for the problems in a wide spectrum of disciplines. For instance, in adult Second Language Acquisition (SLA) process, as the Critical Period is completed and the instantiation of the parameters available in the inventory of Generative Grammar is not possible and the access to this process atrophies, the learner has to utilize his or her learning strategies (Schachter, 1989). These language-learning strategies that comprise *inferencing, hypothesis testing, making generalizations, deduction* match with the quality of the critical thinking skills.

McLaughlin (1989) argues that Cognitive Theory, one of the second learning theories, "is based on the work of psychologists and psycholinguists. Within this framework, second language learning is viewed as the acquisition of a complex cognitive *skill*, because much of the task must be practiced and integrated into fluent performance" (p.133). Additionally, McLaughlin states that "at later stages of second -language development, inferencing strategies predominate as learners attend more closely to input data". Inference along with the other language learning strategies is some of the subsets of the

Watson-Glaser Critical Thinking Appraisal (WGCTA) (1980).

1.3 The purpose of the study

Although the relationship between proficiency in a foreign language and critical thinking skills has not yet been fully researched, the above mentioned theoretical and empirical studies imply that adult second language (English in our case) learners are supposed to have better critical thinking strategies according to their second language (L2) proficiency levels than those who have little or no L2 knowledge.

In this study, conducted with the adult learners of English at the English Language Teaching (ELT) department and the students at Primary School Teacher Education (PSTE) Department of Çukurova University, Adana, we seek to understand the nature of critical thinking skills our students possess and the relationship between these skills and the total critical thinking ability. Furthermore, a comparative analysis between the critical abilities of ELT students and the ones of PSTE department will be carried out in order to find out whether the proficiency in an L2 counts in this respect. In addition to proficiency in a second language, other factors such as socio-economical status (SES) and its effect on critical thinking will be investigated. Consequently, the first underlying assumption of this study is that if someone is highly proficient in a second language, he or she is also assumed to be competent in critical thinking. The second assumption is that someone with upper socio-economical status might be a strong critical thinker.

1.4 Research questions and hypotheses of the study

The research questions guiding this study are as follows:

- Does the level of critical thinking ability increase as the subjects' language proficiency level increases?
- Is there a relationship between the participants' critical thinking ability and factors related to socio-economical status specifically parents' educational background?
- In what subset modules of WGCTA do the subjects vary in their performance according to their level of L2 proficiency?
- Do Turkish students' critical thinking ability differ from those of the American university students who formed the population of the WGCTA and whose percentiles and means have been reported in the manual?

The hypotheses derived from the research questions are presented below:

H1: There is a significant increase in the level of critical thinking of the subjects as they become more proficient in English.

H2: There is a relationship between the participants' critical thinking ability and factors related to socio-economical status specifically parents' educational background.

H3: The subjects are expected to display dissimilar performance in each of the subsets of the WGCTA.

H4: Turkish students' critical thinking ability differ from those of the American university students who formed the population of the WGCTA and whose percentiles and means have been reported in the manual.

1.5 Definitions of terms

State High Schools: These are the state schools to which all high schools students can attend without any special requirements.

Anatolian State High Schools: These schools are state schools as well; however, only the ones who passed an entrance exam at the end of the secondary schools can attend these schools. A preparatory class is mandatory and some of the science courses are offered in English in these schools.

The language proficiency level: The language proficiency level of the students was determined by the administration of Michigan Proficiency Test (Form Q), a standard test prepared by the Michigan University and published by the Michigan University Press. In the manual of this test, the students who scored 0-29 from the test were named as beginners; those who scored between 30-47 were named as high beginners. In this study, we renamed these labels as false beginners (FBG) for the first, and for the latter beginners (BG). By intermediate level (IG), we mean the students who earned between 60-74, and the scores of the advanced students (AG) ranged between 75-100.

Critical period: The American psycholinguist Eric H. Lenneberg, argued that this period existed in the case of language acquisition. The development of language acquisition was said to be the result of brain maturation: the hemispheres were equipotential at birth, with language gradually becoming lateralized in the left hemisphere. The process began at around the age of 2 and ended at puberty, when the brain was fully developed, and lateralization was complete. At this point there were no longer any neural 'plasticity', which

would enable the right hemisphere to take over the language function if the left hemisphere was damaged (Crystal, 1989, p.263).

Foreign language vs. second language: (1) a language that is not a native language in a country. A foreign language is usually studied either for communication with foreigners who speak the language, or for reading printed materials in the language.

In North American applied linguistics usage, “foreign language” and “second language” are often used to mean the same in this sense.

- a. A foreign language which is taught as a second subject but which is not used as a medium of instruction in schools nor as a language of communication within a country (e.g. In government, business, or industry). English is described as foreign language in France, Japan, China, etc.
- b. A second language is a language which is not a native language in a country but which is widely used as medium of communication (e.g. in education and in government) and which is usually used alongside another language or languages. English is described as a second language in countries such as Fiji, Singapore and Nigeria.

In *both* Britain and North America, the term “second language” would describe a native language in a country as learnt by people living there who have another “first language”, English in the UK would be called the a second language of immigrants and people whose first language is Welsh (Dictionary of Applied Linguistics, 1985, p.109).

CHAPTER II

REVIEW OF LITERATURE

2.1 Definition of critical thinking

Although there has been a large amount of research conducted on the nature of critical thinking, controversies about its definitions still exist.

According to Elder and Paul (1994), critical thinking is "... the ability of thinkers to take charge of their own thinking. This requires that they develop sound criteria and standards for analyzing and assessing their own thinking and routinely use those criteria and standards to improve its quality" (pp.34-35).

The underlying fundamentals in the Western tradition of critical thinking originate from Socrates. These fundamentals include a readiness to question all assumptions and an ability to recognize when it is necessary to question, which are parts of a disciplined inquiry (Furedy, 1985). In the literature, the core of critical thinking has been seen as reflective skepticism (Baker & Jones, 1981; Ennis, 1962), or an understanding of what another person is thinking (McKeachie, 1997). Scholars have not yet come to a clear consensus in the literature on the issue of whether critical thinking is an innate ability. In other words, the debate is whether it is an intelligence or scholastic attitude, namely a learned or taught skill (Paul, 1984). In some circles, the term critical thinking is used to cover all thinking operations, from decision making, to analysis of part-whole relationships, to recall; whereas in other circles it means the skills drawn from Bloom's taxonomy (see Section 2.12).

Ennis (1985b), one of the pioneers of critical thinking movement in North America, defines the concept of critical thinking as “.... a practical, reflective activity that has reasonable belief or action as its goal” (p.73). He says that this general interpretation is stronger because it includes abilities and dispositions. Ennis (in Fisher, 1995, pp.68-69) has identified 12 aspects of critical thinking. Each aspect is accompanied with a question in order to help in the critical analysis of an idea:

1. Grasping the meaning of a statement *Is it meaningful?*
2. Judging whether there is ambiguity in reasoning *Is it clear?*
3. Judging whether statements contradict each other *Is it consistent?*
4. Judging whether a conclusion follows necessarily *Is it logical?*
5. Judging whether a statement is specific enough *Is it precise?*
6. Judging whether a statement applies a principle *Is it following a rule?*
7. Judging whether an observation statement is reliable *Is it accurate?*
8. Judging whether an inductive conclusion is warranted *Is it justified?*
9. Judging whether the problem has been identified *Is it relevant?*
10. Judging whether something is an assumption *Is it taken for granted?*
11. Judging whether a definition is adequate *Is it well defined?*
12. Judging whether a statement taken on authority is acceptable *Is it true?*

Many researchers associate critical thinking, problem solving and decision making with each other, however there are some slight differences. They tend to emphasize the *outcomes* of critical thinking rather than its characteristics. For instance, the definition by Ennis (1995) cited above stresses on the last act of “deciding what to do”. Beyer (1988) defines such thinking as combination

of "..... knowledge into a perspective of what we *do* with knowledge, emphasizing the intellectual tools and skills that process and organize knowledge"(p.4). This concept is often expressed as seeking reasons, weighing, reconciling, and evaluating arguments and points of view, and drawing conclusions so as to make judgements.

In 1990 Delphi study, conducted under the leadership of Facione, there has been a consensus on the definition of critical thinking. Many experts from a diversity of disciplines took part in this study in order to define critical thinking. It took these experts two complete years to come up with a general agreement of critical thinking definition. The definition resulted from this study is as follows:

We understand critical thinking to be purposeful, self regulatory judgement which results in interpretation, analysis, evaluation, conceptual, methodological, criteriological, or contextual considerations upon which that judgement is based. Critical thinking is essential as a tool of inquiry.

As such critical thinking is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, critical thinking is a pervasive and self-rectifying human phenomenon. (American Philosophical Association, 1990, p.4)

In 1996, the Sixth International Conference on Thinking has come up with the following definition:

Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of

excellence mindful command of their use. It entails effective communication and problem solving abilities. (p.7)

Some researchers have begun to include the crucial components of critical thinking in their descriptions. For example, McPeck (1981) proposes that “the propensity and skill to engage in an activity with relative skepticism is an essential component of this complex concept”(p.152). While Siger (1991) offers that “thinking involves a number of mental processes that are employed in the service of solving problems”(p.43), Presseisen (1991) suggests, “thinking is generally assumed to be a cognitive process, a mental act by which knowledge is acquired”(p.56). The definition often used by researchers is developed by Glaser (1985a), on which Watson and Glaser Critical Thinking Appraisal (WGCTA) is based. Glaser (ibid.) offers that critical thinking has three main components. These are: “1. an *attitude* of being disposed to consider in thoughtful, perceptive manner the problems and subjects that come within the range of one’s experiences; 2. *knowledge* of the methods of logical inquiry and reasoning; and 3. *skill* in applying those methods” (p.26). As it is clearly seen, the definition states that critical thinking is a composite of attitudes, knowledge, and skills. The attitude referred to here can be described as one of inquiry involving the ability to recognize problems and to accept the need for providing evidence that is asserted to be true. The knowledge needed consists of knowledge of the type of valid inferences, concepts, and generalizations where the preciseness or the weight of the evidence is reasonably decided. The skills that are needed are the ones used in applying

these attitudes and knowledge. These components of thinking will be dealt with more broadly in the next section.

2.2 Different approaches on defining thinking

Although researches are not completely unanimous on one single definition, of critical thinking, there is general agreement among scholars that there are four different philosophical approaches of critical thinking. These approaches comprise *cognitive psychologists*; *developmental psychologists*; *philosophers* and *educators*.

According to Davis (1984), cognitive psychologists often see critical thinking as much of a technical skill. They have taken major steps toward understanding how human beings generate, process store and retrieve information and knowledge. Sternberg (1999, p. 46) describes critical thinking as “the mental processes, strategies and representations people use to solve problems.” In essence, Beyer (1995), points out that psychologists tend to describe critical thinking from the standpoint of how thinking happens.

Developmental psychologists, on the other hand, define critical thinking as a developmental process building a series from tangible to formal thinking. The Perry (1981) method is one of the broadly used tools in gauging intellectual development of college age students. This model explains a consistent pattern of growing cognitive complexity that has proven to be a functional, heuristic method for solving problems by inductive reasoning and trying to measure the general outcomes of college education (Moore, 1991). The Perry method is often used to measure critical thinking growth, an

indispensable outcome expected of college education (Kurfiss, 1988; Mezirow, 1990).

As for philosophers, they have the tendency of not sharing the same views as the cognitive psychologists when it comes to define critical thinking. They observe the concept of critical thinking as a whole that cannot be broken into parts and whose fundamental function is to create meaning.

Paul (1982, p.2) makes a distinction between “weak sense” and “strong sense” critical thinking. According to him, those who use their skills of argumentation and analysis mainly to attack and challenge others who do not share the same ideas with them are practicing critical thinking in the weak sense. On the other hand, as Paul (1988b, pp.3-4) continues “a strong sense critical thinker is not routinely blinded by his own point of view....He realizes the necessity of putting his own assumptions and ideas to the test of the strongest objections that can be leveled against them.”

This shows us that thinking reveals different perspectives such as psychological, philosophical, and educational concerns. From the psychological perspective, thinking is information gathering, transmitting, and storing. Nickerson (in Presseisen, 1986) stresses not only some basic abilities that constitute thinking, such as reasoning and discovering relationships, but the methods and the attitudes that make thinking effective. From the philosophical perspective, thinking involves reasoning in a number of ways such as understanding certain kinds of relationships, and detecting particular problems or ambiguities (Presseisen, 1986).

The educators' views on critical thinking are to some extent a combination of the psychologists' and philosophers' point of views. Beyer (1995), an educational theorist, suggests that thinking is made up of three main parts: 1. Mental operations (cognitive and meta cognitive), 2. Knowledge (epistemological, heuristic and domain-specific knowledge-knowledge of the subject area about which one is thinking), and 3. Attitudes (dispositions). These are the essential characteristics of any kind of thinking. This framework of thinking components resembles Glaser's (1985a) framework, which includes the elements of attitude, knowledge and skill regarded as important basics of thinking. Here are some more details about these three essential characteristics of critical thinking.

2.2.1 *Mental operations*

Theorists agree that certain mental activities are involved in the process of thinking. Our mind appears to carry out some operations when we think.

These operations are of two types that are known as 1. *Cognitive* and 2. *Metacognitive*.

2.2.1.1 *Cognitive operation*

This type of operation is used to generate and find meaning. Included among these kinds of operations is a range of complex strategies such as, decision-making and problem solving. Presseisen (1986, p.11) cites four types of complex thinking processes as follow:

- *Problem Solving*- using basic thinking processes to resolve a known or defined difficulty; assemble facts about the difficulty, and determine additional information needed; infer or suggest alternate solutions and test them for appropriateness; potentially reduce to simpler levels of explanations and eliminate discrepancies; provide solution checks for generalizable value.
- *Decision Making*- using basic thinking processes to choose a best response among several options; assemble information needed in a topic area; compare advantages and disadvantages of alternative approaches; determine what additional information is required; judge the most effective response, and be able to justify it.
- *Critical Thinking*- using basic thinking processes to analyze arguments and generate insight into particular meanings and interpretations; develop cohesive, logical reasoning patterns and understand assumptions and biases underlying particular positions; attain a credible, concise and convincing style of presentation.
- *Creative Thinking* – using basic thinking processes to develop or invent novel, aesthetic, constructive ideas or products, related to precepts as well as concepts, and stressing the intuitive aspects of thinking as much as the rational. Emphasis is on using known possible, as well as to elaborate on the thinker's original perspective.

The goal of higher-order thinking is to engage students in purposeful, extended lines of thought. Thus, they can identify the task or problem type,

define and clarify essential elements and terms, judge and connect relevant information, and evaluate the adequacy of information problems (Quellmalz, 1985). Presseisen (1991, p.56) presents a suggested model of complex thinking processes which will be useful to compare the four strategies in terms of their characteristics and final outcomes as in Figure 2.1.

HIGHER -ORDER SKILLS			
Problem Solving	Decision Making	Critical Thinking	Creative Thinking
Task			
Resolve a known difficulty	Choose a best alternative	Understand particular meaning	Create novel or aesthetic ideas/products
Essential Skills Emphasized			
Transformations Causation		Classifications Relationships	
Relationship Transformation Causation		Qualification Relationships Transformations	
Yields			
Solution Generalization	Response	Sound reasons proof, theory	New meanings pleasing products

Figure 2.1. A Model of Thinking Skills: Complex Model Presseisen (1991, p.56)

Presseisen (1991) argues that some of the above-mentioned thinking processes may be more applicable to specific subject matter than to other areas. She continues exemplifying that problem solving skills would be perfect for mathematics or science teaching while decision making would be helpful for social studies and vocational studies. Critical thinking may be more pertinent to language arts classes, whereas, creative thinking might improve all subjects

especially art, music, or literature courses. What is important is that the objectives of the certain complex process and the targets set for learning in the particular subject matter should be corresponding and reinforcing. According to Presseisen (1991), complex-thinking processes might be introduced at middle school or early junior high school. This would be the proper time to start training the students in higher-order skills or complex thinking processes.

2. 2.1.2 Metacognitive operation

When the mind is thinking, it is talking to itself.

-Plato

Metacognition, the second type of operation, can be described as thinking about thinking. It involves us in becoming conscious of our own ways of thinking while exploring various possible routes to resolving a particular problem (Presseisen, 1986). Costa (1991a) defines metacognition as “our ability to know what we know and what we don’t” (p.211). He also states that “If you caught yourself having an inner dialogue inside your brain, and if you had to evaluate your own decision-making/problem solving processes, you were experiencing metacognition”(Costa, 1991a, p.211). Namely, operations of planning, self-monitoring and assessing one’s own thinking are recognized metacognitive or executive thinking skills. When using the process, the following strategies might be useful for building metacognitive skills: Identify Concerns, Set a Goal, Form a Plan, Act, and Follow-up (Way, 1986).

According to Wilen & Phillips (1995), “....metacognition refers to what a learner knows about his or her thinking processes (conscious

awareness) and the ability to control these processes by planning, choosing, and monitoring”(p.136). They suggest that there are two components of metacognitive process, which are *awareness* and *action* (see Figure 2.2).

While conducting a task, awareness of one’s cognitive behavior comprises awareness of the aim of the assignment, awareness what is known about the task, awareness of what needs to be known, and awareness of the methods and skills that promote or hinder comprehension.

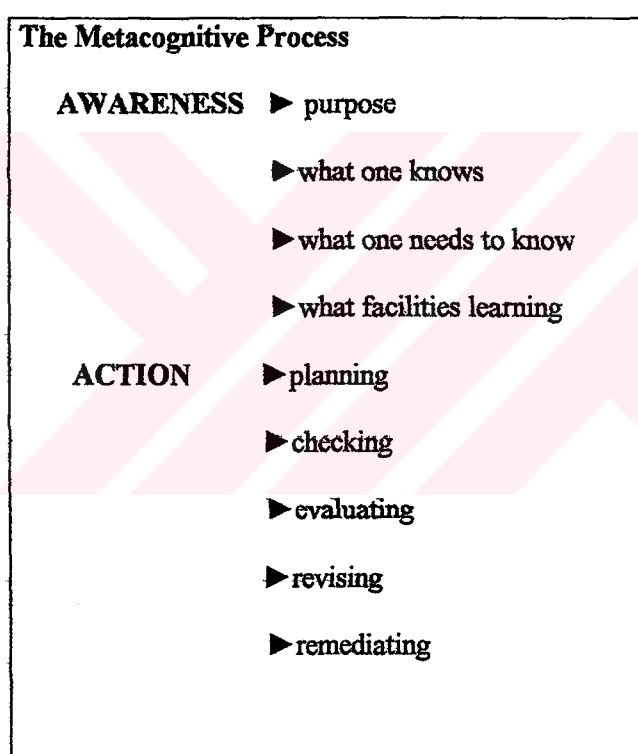


Figure 2.2 The Metacognitive Process (in Wilen & Phillips; 1995, p.136)

Action, on the other hand, is the ability to use cognitive monitoring or self-regulatory mechanism to make sure that completion of the task is done in a successful manner, for example, checking the result of any effort to solve the

problem, such as planning one's own methods of learning, and remediating difficulties faced via using compensatory methods (Wilén & Phillips, 1995).

Sanacore (in Wilén & Phillips, 1995, p.136) defines metacognition as “knowing what you know,” “knowing what you need to know,” and “knowing the utility of active intervention.” Many students seem to lack this metacognitive skill, which is needed to become an effective thinker.

Wilén and Phillips (1995, p.136) state that “to be an efficient and effective thinker, the learner should be able to monitor his or her degree of understanding, be aware of the knowledge possessed, be conscious of the task demanded, and know the strategies that facilitate thinking.”

2.2.2 Knowledge (epistemological, heuristic and domain-specific knowledge)

This element of thinking is composed of general principles or rules depending on previous experiences, which generally lead to ideal outcomes (Beyer, 1995). The knowledge element of the thinking process also includes something about the nature of knowledge itself. One more component of the knowledge is knowing that what a person or group believes or considers as knowledge may not be accepted by another person or group. In other words, this component of knowledge can be considered to be somewhat individual and relative.

Epistemic Cognitive Processes are probably the least understood kinds of thinking processes. Epistemic cognition relates to the skills associated with understanding the limits of knowing, particularly subject matter (Presseisen,

1991). According to Costa (1991b), “epistemology is the study of how knowledge is produced”(p.33). Costa further states “epistemic cognition is the study and comparison of great artists scientists, and scholars and the differential processes of investigation, inquiry, and creativity that underlie their productivity” (1991b, p.34). Another epistemological question is what knowledge is more important to the student’s learning. This is also one of the educational concerns (Perkins in Presseisen, 1986).

Heuristics, according to Beyer (1995), are principles or rules on past experience that usually, if not always, lead to make decisions and solve problems in a desired way. Although they are generally a helpful aid, they do not always produce a correct response.

Domain-specific knowledge, knowledge of the subject matter, is another essential element of the knowledge component. Those who are very successful at thinking in a subject area are those who know most about that particular subject (McPeck, 1981; Nickerson, 1991).

2.2.3 Attitude

Implementing the mental operations and applying the knowledge, the two components of thinking, is not an easy task. Applying these operations and knowledge efficiently needs specific attitudes or adjustments (Ennis, 1985; Paul, 1994). Habitual tendencies of individuals to act in a specific way comprise the last component of the process of thinking (Barell, 1995; Beyer, 1995; Ennis, 1985a; MckPeck, 1986, Paul, 1988a).

According to Presseisen (1991), “when we focus on what we mean by thinking, we need to consider the various levels of thinking that human beings

are capable of” (p.61). Here, she stresses that the complexity of the cognitive process is obvious. She states that a four-component model has been created by this examination:

- **Cognition:** the skills associated with essential and complex processes.
- **Metacognition:** the skills associated with the learner’s awareness of his or her own thinking.
- **Epistemic cognition:** the skills associated with understanding the limits of knowing, as in particular subject matter and the nature of the problems that thinkers can address
- **Conation:** the striving to think clearly, including personal disposition, which is the inclination to develop and use attitudes and practices overtime (1991, p.61).

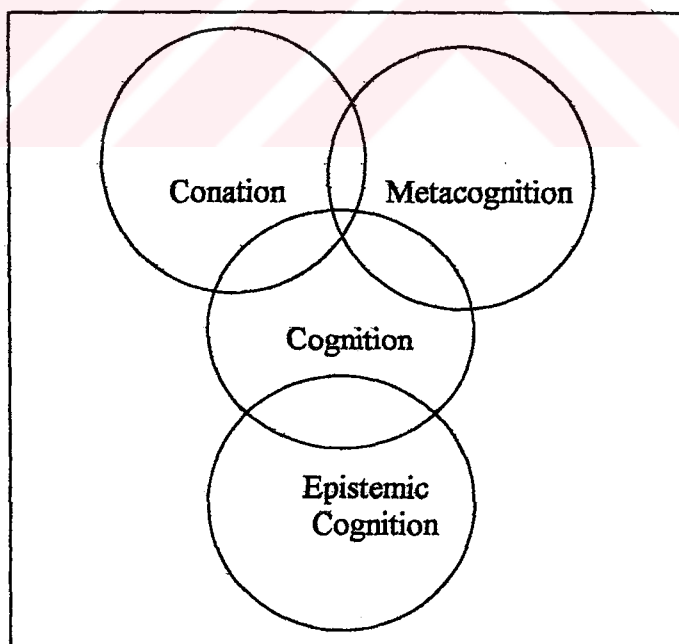


Figure 2.3 A Global View of Thinking (1991, p.62)

Presseisen (1991, p.62) depicts the definitions mentioned above in the Figure 2.3. When educators think about this four-component model, they can then inspect the related materials suitable to enhance thinking in their classes.

Ennis (in Marzano et al. 1988) defines critical thinking as reflective and reasonable thinking that is focused on deciding what to believe or do. He suggests three types of critical thinking skills.

1. Ability to define and clarify problems, issues, conclusions, reasons, and assumptions
2. Ability to judge creditability, relevance, and consistency of information
3. Ability to infer or to solve problems and draw reasonable conclusions.

(Ennis in Marzano et al. 1988, p.45)

These three types of skills, in fact, reflect higher-level skills of analyses, synthesis, and evaluation of Bloom's Taxonomy (see Section 2.9) of educational objectives. Ennis (1985b) also determines four general sets of abilities that constitute critical thinking:

1. Clarity-related abilities
2. Inference-related abilities
3. Abilities involved in decision making
4. Problem solving abilities

These four categories, when combined with the critical thinking dispositions, are intended to cover comprehensively the process of deciding what to believe or do. This relationship is exhibited in Figure 2. 4 .

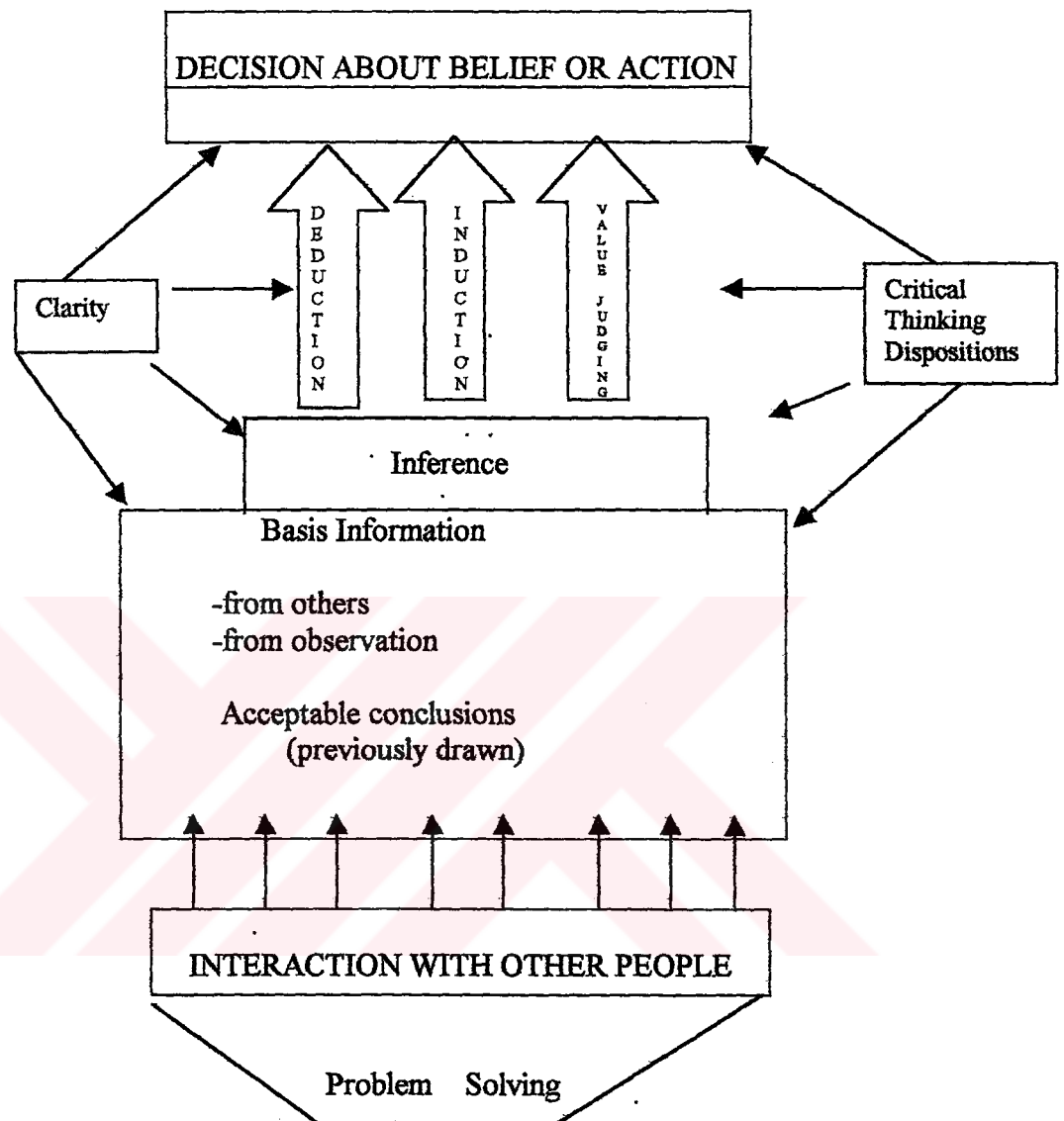


Figure 2.4 The Process of Deciding What to Believe or Do

2.3 Characteristics of strong and weak critical thinking and thinkers

Individuals who are considered to be critical thinkers insist that evidence and logical reasoning to support whatever stated should be true. Moreover, Eisner (1983) stresses that they value skepticism and consider alternative opinions. Dispositions that drive critical thinking include the following:

- Seeking a clear statement for a problem or question to occur
- Research questions the proposed assumptions on which problems or theses are founded
- Examining a variety of viewpoints on purpose
- Trying to be informed to a full extent
- Using reliable sources and mentioning them
- Seeking and providing evidence to support a claim
- Willingly changing a viewpoint or a judgment when evidence and reasons are so warrant
- Considering situations, issues, purposes, and consequences taking sound and reliable basis rather than judging them on fixed, dogmatic precepts or emotional wistful thinking
- Considering the case globally
- Persisting in conducting a thinking task
- Trying to remain consistent within the boundaries of the main point
- Being nonsubjective
- Being reluctant to believe and displaying a healthy skepticism
- Seeking various alternatives after an evidently acceptable alternative has been put forward

- Taking as much information as possible for granted prior to making a judgment
- Taking other points of view seriously than one's own consideration
- Reasoning from assumptions with which one disagrees without allowing the disagreement interfere with one's own reasoning
- Keeping judgment back in case of an evidence or reason is insufficient
- Taking a stand when the evidence and reasons are adequate to do so
- Dealing with the parts of a complex whole orderly
- Being equipped with the skills in using entailed critical thinking abilities
- Being sensible to the emotions, level of knowledge, and degree of sophistication of others (Beyer, 1988; Costa, 1992; Ennis, 1985a; Halpern, 1994; Parks, 1997; Paul, 1990b; Perkins, Jay & Tishman, 1993).

According to Johnson and Blair (1984), a person who can be described as a critical thinker has the tendency to ask the following questions and the ability to find answers to these questions:

- Is it clear? (What does it mean?)
- Is that right? (True? Plausible? Likely?)
- How can anybody know that?
- What is the evidence for it?
- What is the negative evidence for it? (What other possibilities are there?)

- What are its implications? (or consequences?)
- What are the unstated assumptions at work?

(1984, p.56)

Similarly, Facione (1991) expresses that the approaches to life and living in general which characterize critical thinking include:

- inquisitiveness with regard to a wide range of issues,
- concern to become and remain well-informed,
- alertness to opportunities to use critical thinking,
- trust in the processes of reasoned inquiry,
- self-confidence in one's own abilities to reason,
- open-mindedness regarding divergent world views,
- flexibility in considering alternatives and opinions
- understanding of the opinions of other people,
- fair-mindedness in appraising reasoning,
- honesty in facing one's own biases, prejudices, stereotypes, egocentric, or sociocentric tendencies,
- prudence in suspending, making or altering judgments,
- willingness to reconsider and revise views where honest reflection suggests that change is warranted.

(1991, p.54)

Experts such as MacDonalds (1988), McPeck (1981) went beyond approaches to life and living in general to emphasize that good critical thinkers can also be described in terms of how they approach specific

issues, questions, or problems. According to them, the qualifications in this respect would include:

- clarity in stating the question or concern,
- orderliness in working with complexity,
- diligence in seeking relevant information,
- reasonableness in selecting and applying criteria,
- care in focusing attention on the concern at hand,
- persistence through difficulties are encountered,
- precision to the degree permitted by the subject and the circumstances.

(p.28)

Facione (1990) states that somebody strongly disposed toward critical thinking would probably agree with statements like these:

- I hate talk shows where people just state their opinions but never give any reasons at all.
- Figuring out what people really mean by what they say is important to me.
- always do better in jobs where I'm expected to think things out for myself.
- hold off making decisions until I've thought through my options.
- Rather than relying on someone else's notes, I prefer to read the material myself.
- I try to see the merit in another's opinion, even if I reject it later.
- Even if a problem is tougher than I expected, I'll keep working on it.

- Making intelligent decisions is more important than winning argument(p. 12).

In another attempt to describe the attributes of critical thinkers, the Delphi Panel (1990) proposed that the perfect critical thinker is as follows:

The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open- minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit.

(American Philosophical Association, 1990, p.4)

For the characteristics of weak thinkers, as Facione (1990) states, a person dispositions would probably disagree with the statements above but is likely to agree with the following:

- I prefer jobs where the supervisor says exactly what to do and exactly how to do it.
- No matter how complex the problem, you can bet there will be a simple solution.
- I don't waste time looking things up.
- I hate when teachers discuss problems instead of just giving the answers.
- If my belief is truly sincere, evidence to the contrary is irrelevant.

- Selling an idea is like selling cars, you say whatever works.

(p.23)

Basing on these characteristics, we can seek an answer to the question of whether or not critical thinking can be taught. Researches have been trying to find the most effective method to teach critical thinking. Some have claimed that critical thinking should be taught in context of specific content or specific problem situations in which transfer across the content area is very limited. However, other scholars argue that once separate elements of critical thinking are clearly defined, effective exercises can be formed to teach them using familiar content or problem. These experts think that distinct thinking courses are useful. They further emphasize that once thinking skills are learned, they can be generally transferred to other areas. McPeck (1981) suggests the following analogy when asked whether thinking should be taught as a separate skill. In the analogy, he compares the performance of reasoning ability to the concept of speed:

If just out of blue someone offers to improve our speed, the first thing we would properly ask is 'at what?' We'd probably all like to be speedier at running, or reading or typing, or even changing mufflers, but we know that no single course could improve our speed at all things. Given the that range of things over which we'd like to improve our reasoning ability is perhaps even wider than the range of things over which we'd like to improve our speed, then the prospects for improving our general are even dimmer. It follows from this that it

makes no sense to talk about critical thinking as distinct subject and that it therefore cannot profitably taught as such. (pp.4-5)

Adler (1986) shares McPeck's doubts when he suggests that intellectual dispositions are acquired in precisely the same fashion that all corporal habits of skill are developed by training, not by instructive teaching using educational materials that dictate the rules to be undertaken. He observes that the students who are able to score high marks on the logic exams are not able to display critical thinking ability when they take part in the seminars he also teaches. He suggests this experience as an explanation for the lack of required formal logic courses in most colleges today, and suggests that the fallacy that is widespread today is that thinking is a skill that can be acquired in isolation from all other skills that enable minds to be used successfully in the performance of skills such as judging, reasoning, problem solving, arguing and defending or rejecting conclusions. He believes that this is not the case and that the instructors should try to direct the students in thinking in every course that is offered and not give any explicit instruction in thinking skills as such. Hyde and Bizar (1989) also disagree the teaching of thinking as a supplementary course of study.

These experts stand on one extremum of a continuum of belief relevant with how and where critical thinking education should exist. On the other hand, there are some cognitive psychologists whose studies have demonstrated that courses teaching general thinking skills are successful in transferring of these skills to the students' ability to think critically in daily life (de Bono, 1983; Hernstein, 1986; Nickerson, 1991; Levy, 1997; Sternberg

& Spear-Swerling 1996). In fact, majority of educators, cognitive psychologists, and philosophers fall somewhere in the middle of this continuum.

Being a cognitive psychologist, Nickerson (1991) proposes that thinking is a natural part of life and that all human beings are capable of thinking critically without being taught formally. According to him:

....All of us compare, classify, order, estimate, extrapolate, interpolate, form hypotheses, weigh evidence, draw conclusions, devise arguments, judge relevance, use analogies and engage in numerous activities that are typically classified as thinking. This not to say that we do all of these things well, but that we do them with or without prodding and the benefit of formal training. Descartes famous dictum, 'I think therefore I am ', might well be turned on its head to 'I am, therefore I think'. If thinking is not a consequence of being, it is certainly a consequence of being human... We are wired to think, and we can no more avoid doing so than we can avoid breathing. (1991, p.28)

To Nickerson, majority of educators would consent with the idea that students should learn to think more effectively, more critically, more coherently, more creatively, and more deeply than they often normally do. There is little scientific evidence that students attain good thinking skills as a result of studying traditional textbooks. Although domain-specific knowledge is necessary to good thinking, it is not sufficient to guarantee that good thinking will happen. Glaser (1985b), points out:

As a student tends “naturally” to develop a natural disposition, to consider thoughtfully, the subjects and the problems that come within the range of his or her experience; nor he is likely to acquire knowledge of the methods of logical inquiry and skill in applying these methods, simply as a result of having studied this subject or that. There is little evidence that students and reasoning acquire skill in critical thinking as a necessary by- product of the study of a given subject. (p.27)

As put forward in Adler’s study, teaching formal logic in isolation does not indicate students how to apply that logic to the subject matter of the various disciplines. Perkins (1986), suggests unless students are taught how to immix together or relate logical skills to course contents, they will probably be incapacitated to do so. Lipman (1988) agrees:

The model of the university is a paradigm of overspecialization. If I had my way, instead of giving undergraduates a course in logic or critical thinking and a course in biology or anthropology or philosophy, I would see to it that they got a course in Biological Reasoning, or Anthropological Reasoning or Philosophical Reasoning, so as the logical skills and the course contents would be presented to the students as integrated with one another from the very start (p.6).

However, there are scholars who argue that reasoning is more of an undivided process, and they would teach critical thinking as a separate course

and leave it to students to make the synthesis of skills and contents (Beyer, 1995; Levy, 1997; Potts, 1994).

If students are required to gain good thinking skills in the classroom setting of any specific field, overt attention needs to be given to that goal. Nickerson's study (1988) reveals that thinking process is not likely to be understood spontaneously or as an occasional consequence, but precise feature of instruction in this field is its absence. According to Nickerson, reasoning skills are procedural routines which are rarely made overt to students or teachers. These skills are not usually the main concentration of a didactic activity or unit. They are considered to be intaken by students as they involved in various tasks. Though some students become proficient problem solvers or critical thinkers with implicit instruction and without being able to explain their strategies, for most students this transfer does not happen without advance preparation.

Consequently, exposure to subject matter alone does not improve critical thinking ability. Even though, it is assumed that repeated attempts to learn or to solve problems, little is taught in the curriculum about ways of solving the problems that can be applied to problems one might encounter in a variety of real life situations (Chaffee, 1996; Levy, 1997; Parks, 1997). Therefore, there is a good reason to improve the characteristics of individual students as learners.

2.4 Types of thinking programs

According to Ennis (1989, p.132) four different instructional approaches can be proposed in discussing the teaching of critical thinking. The properties of this approach are broadly adapted by numerous researchers in the analyses of teaching programs for critical thinking. These approaches include:

1. *The general approach:* In this approach, thinking skills are taught in a separate course, which can be independent of specific content or can be content-based using everyday life type problems as content areas
2. *The infusion approach:* This approach is based on infusing of thinking skills through well-understood subject matter instruction in which general principles of critical thinking dispositions and abilities are made explicit.
3. *The immersion approach:* In this approach similar thought provoking kind of subject matter instruction is required in which students do get deeply immersed in the subject, but in which general critical thinking principles are not made explicit.
4. *The mixed approach:* This is a combination approach in which a separate critical thinking course, teaching general principles of critical thinking, is combined with either the infusion or the immersion approach.

Bereiter (1984) examined various thinking programs to be implemented in the colleges and found that the most frequent ones were the mixed, or

infusion, approaches. His evaluation revealed potential problems with most of these critical thinking programs. One of the problems he observed was that when thinking was taught as enrichment, either special thinking exercises were devised and implemented to the curriculum or specific courses were offered. In both cases, thinking was considered as a concept that was to be implemented in as if it were a curriculum element. Another problem was that when treated as a separate academic subject matter, it was probable to have secondary importance than the main subjects and was more likely to disappear from conventional disciplinary areas. The instruction in such a course was sometimes superficial as it was disintegrated from the content of existing course. In the separate approach, thinking would result in the same way as reading skills taught separately from literature. Briefly, Beretier concludes that the most effective programs are the ones using content to teach critical thinking skills. In other words, instruction of thinking skills is infused across the courses in the curriculum.

Joyce and Weil (1986) support such approach in their suggestion that the most effective approach to the instruction of thinking is to use such an infusion approach with models of teaching designed to teach both content and intellectual process directly. They suggest that the current resource of these types of models is more than enough to design the most powerful ways of thinking. Moreover, the mentioned models teach thinking, and at the same time, increase the learning of the content and academic skills. In other words, they suggest that to teach the content with failing to teach thinking simultaneously not only underestimates thinking, but it is also ineffective.

2.5 Examples of thinking programs

A variety of different programs are available to teach students higher-order thinking skills. Nickerson (1984b) classifies five successful types of teaching thinking skills programs commonly used at the university level. They all implement either a mixed approach or an infusion approach. These classifications include:

1. Cognitive –process approaches: The programs adapting these approaches consider the thinking ability depending on certain underlying processes such as, comparing, ordering, classifying, inferring, and predicting. These are usually tailored across the curriculum rather than in an separate course. The infusion approach can be included in this category. Examples of this program include Feuerstein's (1980) Instrumental Enrichment program (FIE).

2. Heuristics: These are essentially problem-solving strategies. An example of this is deBono's CoRT program (1984,1985) and Bransford and Stein's (1993) IDEAL problem solver program.

3. Formal Thinking or Stage Development: These courses stem from the developmental theory in which the developmental stage of the student is identified . These are also called learning cycle programs. The mixed approach is an example of this is because it is a combination of both the general approach and the infusion approach, which is accomplished across the curriculum. SOAR, Carmichael's (1980) program is an example to illustrate the content of such courses.

4. **Language and Symbol Manipulation:** Writing courses designed on a curriculum basis are usually in this type and they would be classified as the infusion method.

5. **Thinking about Thinking:** Metacognition process is also involved in this type. It is a commonly used in infusion based critical thinking programs.

6. **Learning Strategies:** A required study skills course often included in university curriculums is in this category.

7. **Thinking Skills and Knowledge:** In addition to a basic general course in thinking skill, these mixed approach programs use the content to teach critical thinking skills. (Nickerson 1984b, p.84)

2.6 Instructional strategies

Costa (1992) mentions four respective categories of teaching strategies utilized to reinforce critical thinking that could be utilized without considering the type of teaching program approach a college might decide on as most suitable for its institution.

The four categories offered by Costa are as follow:

- Directive strategies that help students to acquire and retain important facts, ideas, and skills
- Mediative strategies that help students to develop reasoning, concepts and problem solving processes
- Generative strategies that help students to develop new solutions, insight, and creativity

- Collaborative strategies that help students to learn to relate to each other and work cooperatively in groups.(Costa, 1992, p.135)

The main purpose of directive strategies is to assist the students attain and retain the information and skills that are useful to them as intellectual and effective citizens. As their name suggests, directive strategies require students to accurately adopt the behaviors or skills that are exemplified, employed, or instructed by the teacher (Costa, 1992). These strategies assign the teachers the role of presenter of information. The teacher makes all decisions about when and how to introduce the material. In other words, the social control of the classroom ambiance is completely orchestrated by the instructor. The objectives are frequently expressed in terms of recall or student's ability to show comprehension. Behavioral goals of the directive strategies are commonly termed as "to understand", "to demonstrate", "to acquire", "to recall" and the objectives are usually at the "knowledge" level of Bloom's Taxonomy. Studies (Costa & Garmston, 1997a; de Bono, 1981; Hudgins, 1997) have revealed that when these strategies are employed, students perform better on standardized test of basic skills. Beyer (1995), one of the supporters of this strategy, and other experts (Anderson, 1982; Cornbleth, 1985; Hudgins, 1997) support that direct methods of instruction must be used in order to improve student proficiency in thinking.

Mediative teaching strategies assist students indirectly to convert information, skills, and concepts into new meanings and practices, and to understand the logical ways of problem solving, decision making and critical

thinking (Costa, 1992). These teaching strategies are designed to render students to evaluate different viewpoints in disputable issues to appreciate the opinions and beliefs of others. They also allow students to utilize mutually exclusive possibilities in problem solving processes called “heuristics” (Paul, 1990b; 1994b). Mediative strategies are sometimes called “Socratic” because the instructor mediates by introducing questions and perplexing cases that raise the students’ curiosity and stimulate their inquiry allowing them to test the reached results, practice the concepts they have induced and look for alternative problem-solving approaches (Costa, 1992). The instructor refrains from judging the students’ ideas and invoke them to self-evaluate. After obtaining the required information, students analyze it to generate their own concepts and generalizations (Paul, 1990; 1994). Thus, they become motivated by curiosity essential in the cognitive task, for example, explaining phenomenon, finding patterns, designing systems for generating needed information, inducing concepts, establishing proof, considering alternative points of view and hypothesizing (Barell, 1995; Costa & Garmston 1997a; Paul, 1990a; 1994). Students are supposed to study the problems introduced and the controversial points illuminated by the teacher. They are also expected to use inductive and deductive reasoning to produce an explanation and to support that explanation with logical and evidentiary proof (Paul, 1990c). By employing these strategies over time with skill, patience and close adherence to their attributes, students become more autonomous, increase their problem-solving skills and show greater respect for the varying opinions and points of views of others. Some examples of these strategies include open-ended

discussion, values clarification, inquiry (Suchman, 1964), and moral reasoning (Costa, 1992; Paul, 1991; 1994). Goldmark (1986) mentions that the principal value of this approach is that it teaches how to learn. Suchman comments that, "...it is clear from the research on teaching strategies that the more active and autonomous the learner becomes in a learning process and the more he takes responsibility for decisions regarding the collection and interpretation of information, the more meaningful the learning becomes and the more motivated the learner becomes" (p.39). In meditative strategies, the responsibility of initiation and control is on the part of the learners.

Generative strategies enable learners to invent new knowledge and develop new and perceptive routes of approaching and solving problems. Using generative strategies, teachers encourage students' imaginations by inciting creative imagery, using metaphors and introducing hypothetical and apparently eccentric situations (Costa, et. al 1985b). Students are encouraged to join the generative strategies by their innate human drive toward ability and accomplishment (Barell, 1995). Student outcomes are observed in student essays, development of solutions to unusual problems and creative statement. Research has shown that by employing these strategies, students gradually grow to be more creative in their use of new materials, more understanding and intuitive in suggesting solutions to problems and more symbolically descriptive in their expository writing samples (Costa, Hanson, Silver & Strong, 1985a; Barell, 1995). Examples of these kinds include Buzan's (1988) mind mapping and Perkin's (1985a) program, Creativity by Design (in Costa, Hanson, Silver & Strong, 1985c).

Collaborative strategies pave a way to structure student groups for learning. They enable learners think and find solutions to problems collaboratively, successfully carry out tasks either academic or nonacademic. They also activate and process the social skills indispensable to student success (Joseph, 1998). While the instructor arranges learning, assigns tasks, forms the group, goes over the processes and bids evaluation of group skills, the major focus is for students to become aware of, practice, and evaluate their own application of cooperative group skill (Johnson, 1991). The motivation in the collaborative strategies is the mutual exchange of the group effort (Bruner, 1997). When students take part in such activities they soon realize that the product of group thinking is often superior to that of individual thinking. Hence, they take responsibility for their own roles in the group task and contribute to the group's functioning and productivity (Baker, Costa & Shalit, 1997). Among the examples of collaborative strategies are Johnson and Johnson's cooperative learning (1996) and Glaser's class meetings (1985b). Application of this kind of strategies takes time and practice for both the teachers and the students to learn the skills necessary for the strategies.

The main teaching skills of questioning, structuring, responding and modeling are utilized in each of these strategies. However, they are used in different proportions, sequences, and combinations and for different objectives, depending on the purposes of instruction. For example, teacher questioning is available in any single strategy.

Not a single strategy alone is proposed as the most effective for college level classrooms. In fact, strategies vary considering the goals of the course,

learners and instructors. Figure 2.5 shows the comparison of teaching strategies:

DECISIONS				
Strategy	Goals set by	Methods, means & Materials determined by	evaluation/ completion effectiveness determined by	Source of motivation for learning
Directive	Teacher	Teacher	Teacher	Teacher
Mediative	Teacher	Student	Student	Curiosity about the task
Generative	Teacher	Student	Student	Competency & Craftmanship
Collaborative	Student Teacher Group	Group	Group	Independence reciprocity and a sense of community

Figure 2.5. Comparison of instructional strategies
(from Costa et al. 1985a, p.142)

2.7 Classroom studies conducted on instructional strategies

In spite of the increasing interest in developing college students' critical thinking skill, there are few research studies documenting the development of critical thinking in college student population. One of the few studies carried out at university level studied the effectiveness of a mixed approach course at a community college entitled "Critical Thought Skills." This course tried to develop students' skills such as writing, reading, speaking and thinking skills and also reinforced learners to develop their attitudes towards life and education (Chaffee, 1998). For four years, one section of this course was matched with other courses from other fields. The intellectual abilities taught in the thinking course were supported as the content of the other two courses overlapped. Students in the matched course have developed both subject matter performance and critical thinking growth at a accelerated rate when compared

to learners who were not in matched classes. These findings support the suggestion that the mixed approach is one of the most effective methods of instruction.

Another study conducted in the action research domain is by Jadallah (1984). In his descriptive study, Jadallah devised an instrument to determine the degree to which teachers' teaching styles conform to the principles of reflective teaching. Sample questions used on that survey were

To what extent does the teacher:

Ask divergent questions to identify a problem?

Use materials to introduce conflicting data?

Ask students to state the problem /question in their own words?

Ask the students to define ambiguous or new terms to help make the problem or questions clear and precise?

Present students with hypotheses to test?

Ask divergent questions to solicit hypotheses?

Provide time for students to gather sources and formulate hypotheses?

Arrange chairs in seminar or small-group style?

Direct student-to student interaction?

Allow time for students to reflect on the topics being discussed?

Listen attentively and without interrupting while students express their ideas, opinions and questions? (Jadallah, 1984, p. 213)

Glaser's (1941) research is considered as a very important study in the field of developing critical thinking. In his experiment, he aimed at finding the effects of an eight-week program of teaching for secondary school students

which demonstrated statistically significant development in the score of an experimental class on test of critical thinking. This milestone study revealed that explicit teaching of thinking skills was achievable. This research also served as a base work for the development of the Watson- Glaser critical thinking appraisal, which turned out to be one of the essential standardized tests of critical thinking skill.

In another university level study, Browne et. al. (1977) studied a course specifically designed to teach critical thinking skills. They pre-tested and post-tested o group of seniors and freshmen and revealed that the freshmen who had participated in the course significantly outscored the seniors on the post- test. This experimental study and the other relevant studies indicate that critical thinking can explicitly be taught effectively at the university level.

2.8 Teacher behaviors

The major teacher behaviors thought to enhance students' thinking have been classified as follows:

1. *Creating a hospitable environment:* A place where both students and teachers can feel safe and develop confidence (Costa & Kallick, 1993; Goodlad, 1998).
2. *Teacher characteristics:* Certain identifiable teacher characteristics have been suggested as powerful classroom elements when the primary goal is to help students to critically think (Costa, 1992; Brophy, 1997; Paul, 1994a).

3. *Teacher Roles*: Certain instructional behaviors and teacher roles have been suggested to make an effort to a direct influence on students' effective thinking (Barell, 1995; Costa & Lowery, 1989).
4. *Modeling*: The teacher models desired intellectual behaviors in day-to day problems and strategies of the classroom (Good & Brophy, 1994; Paul, 1990a, 1994b).

2.8.1 Create a hospitable environment

Creating a thinking ambiance in classroom setting might be portrayed by being given confidence with cognitive activity with processing information to make it meaningful rather than storing and quoting information by others (Beyer, 1995; Costa & Kallick, 1993). There are several attributes of classrooms in which valuable thinking and learning processes are facilitated.

Respect is the most important psychological element of hospitable classrooms. Respect for those who are taught, and what is taught is a must. When teachers respect the feelings and opinions of the learners, then the teachers and learners become partners in whatever is aimed to be thought (Smith, 1990). In the encouragement process of the environment, bilateral trust and mutual respect accompany. Learners should feel themselves having equal status with the teachers in the inquiry pursuit in terms of human worth and self-respect. Mutual respect often entails being a good listener. Teachers must help students to value the authority of their own thinking and help them gain confidence in their own reasoning (Walsh & Paul, 1986).

Comments on teaching by Nouwen (1966) written more than three decades ago still makes up the core of a setting where teacher and students can learn from each other as they explore new ways of critical thinking. Nouwen comments on teachers as:

...The hospitable teacher has to reveal to the students that they have something to offer. Many students have been so for many years on the receiving side, and have become so deeply impregnated with the idea that there is a lot more to learn, that they have lost confidence in themselves and can hardly imagine that they themselves have something to give... It is so easy to impress students with books they have not read, with terms they have not heard, with situations with which they are unfamiliar. It is much more difficult to be a receiver who can help the students to distinguish carefully between the wheat and weeds in their own lives and to show the beauty of the gifts they are carrying with them... Teachers who can detach themselves from their need to impress and control, and who can allow themselves to become receptive for the news that their students carry with them, we will find that it is in receptivity that gifts become visible (p.61).

In order to retain and develop such environment, teachers can pay attention to the physical arrangements of the classroom and the kind of teaching materials used. In addition, the kind of interaction and activities that occur should be taken into consideration (Beyer, 1995; Halpern, 1994).

2.8.2 Teacher characteristics, beliefs and attitudes

Several studies conducted in the area (Barnes, 1992; Weimer, 1997; Gage, 1984) have demonstrated that teacher's traits, thoughts and beliefs have an indispensable mediating role in their classroom practice. Thinking process is believed not to be taught only through systematic instruction. Teachers are required to accept that learners can be relied on what to learn and how to think as long as they are introduced to an environment that promotes and encourages thinking (Smith, 1983). While it has been suggested that there is not a specific way to guide a teacher in how to evoke these attributes in the students, Weimer, (1997) showed that it is possible to recognize when a teacher innately possesses this ability. The traits to be possessed by an ideal teacher who devotes himself to the development of critical thinking skills could be cited briefly as follow:

- **Inquiry spirit**

Teachers should realize that their students have an inquiring mind about their own thinking. The critical thinking teacher herself/himself must be actively involved in research and understanding. The teacher must accept uncertainty, welcome counter ideas, define education period as a journey from the unknown to the known in all subject areas (Barell, 1995).

- **Open mindedness**

In the teaching of thinking critically, one of the most fundamental educational approaches are open-mindedness and the ability to create this atmosphere in the classroom setting (Barell, 1995; Brookfield, 1990; Ennis, 1985; Weinsten,

1998). Included in this ability is the willingness to take alternative opinions seriously as well as structuring lessons in such a way to permit divergent thoughts to be expressed and supported (Barell, 1995; Halpern, 1994; Paul, 1986, 1994).

- **Reflective self-awareness**

Educating the learners as critical thinkers requires teacher be aware of the attitudes to be brought into the classroom (Brookfield, 1995b). A self-consciousness regarding the awareness of the students' reaction to the class progress and the awareness of knowledge of students' abilities, needs, expectancies frustration levels are some of the qualities the teacher of critical thinking (Weimer & Lenze, 1997).

- **Flexibility**

Flexibility depends on reflective self-awareness and open-mindedness (Weinstein, 1986). The teacher is expected to be alert to the specific incidents in the classroom because of their quality of being the most effective contexts for critical thinking attitudes to settle in (Brookfield, 1995b; Schnedier, 1996). Such a case requires the teachers to actively participate in the process of the class and think the strategies that will guide the discussion better in advance.

- **Comfortable with silence**

Effective teachers are aware of the fact that sound thinking requires a course of silence, reflection and progress that are not interrupted by any words, no matter how well intended or meaningful (Tobin, 1987). However, sometimes teachers might feel uncomfortable with silence.

- **Self-confident enough to take risks**

The teacher of a critical thinking class should be able to take the initiation to object or discuss the information or facts presented by the authorities in any given specific discipline (Barell, 1995). The strategy accepted in the critical thinking model proposes that neither a textbook nor a teacher can be regarded as an expert. In fact, not all the answers are known and what is more, no one can be an expert on all things (Brookfield, 1999; Halpern, 1994). An ideal teacher of this type accepts this fact and works with his/her students to find answers to the unknown (Barell, 1995). Applying this strategy, students are encouraged to make systematic research and seek for scientific knowledge (Walsh & Paul, 1986). By doing so, teachers model and share with students how to perform appropriate thinking skills and strategies. They also bring student attention into focus on how hypotheses are tested and how conclusions are tested (Beyer, 1995).

- **Takes students seriously**

That teachers take the students' accounts into consideration seriously and provide feedback to complete, correct, and appreciate them is the most arduous task an instructor might face in a critical thinking course (Gage, 1984). It is essential an instructor keep his/her perception channels open and assess the outputs generated by student thinking (Beyer, 1995). According to Weinstein (1988), the most helpful classroom conditions are provided when teachers are interactive and supportive in the face of new positions students may take during the lesson.

- **Willing to share social control**

Classroom group dynamics should be emphasized in order to assure the feeling of mutuality with the learner exists (Dewey, 1933). As Dewey recommends the teacher “loses the position of external boss or dictator but takes on that of a leader of group activities” (p.59). Unfortunately, many of the traits of the traditional classrooms include barriers to conducting thoughtful projects in spite of their authenticity or attractiveness to learners (Brookfield, 1995b). Even the physical properties of most classrooms meet the teacher’s need to control the classroom. To overcome these barriers to share the social control necessary with students to promote thoughtful classroom environment, according to Barell (1995), talent and dedication are needed.

- **Content expertise**

The indispensable role of content competence in effective teaching is obvious, especially at the university level. Study on effective instruction (Sherman, 1987) comprises enthusiasm, clarity, preparation and organization, motivation of interest and thinking, knowledge and love of the content. Studies conducted by Musella and Rusch (1968) reveal that some particular traits, such as teacher enthusiasm, and involvement in the content might be more important than factual knowledge merely. Onosko (1990) found that in order to be most effective, the classroom teacher must control his/her use of knowledge to provide opportunity for student thought.

- **Teacher conception of thinking**

Studies demonstrates that teachers hold a variety of theories and beliefs about instruction, for example, ideas on learning, reading classroom management,

student motivation, discipline, etc. Onosko's (1991) study indicates that there are relationships between the statements regarding teachers' goal and their ideas of thinking.

It seems obvious that teacher characteristics play an important role in the creation of a thoughtful learning ambiance. Teachers need to create a hospitable environment in order to be effective in their teaching. They need to demonstrate an inquiring spirit, open mindedness, self-awareness of the classroom situation and a flexibility to handle the processes as they occur. Moreover, they should tolerate silence and be self-confident enough to take the risks of taking students seriously and share the social control of the classroom setting. Being expertise in the content area is important in all kinds of teaching, however, in the classroom where critical thinking is the main target, instructors should be confident enough to show how much they know instead of using their knowledge expertise to support students when get involved in questioning or brainstorming. Teachers' instructional objectives and ideas of thinking have been demonstrated to be important scopes of classroom thinking (Costa & Kallick, 1993).

2.8.3 Teacher roles

The role of the teacher as a manager has been argued by Good and Brophy (1994). Also, Berliner (1984) observes the teacher as a director and decision mechanism regarding content and selection of cognitive processes to teach as well as to decide about prior knowledge.

Researchers Garland and Ellett (1986) have devised a tool that identified teacher behaviors thought to enhance thinking skills. Many of the behaviors that have already been stated determine teacher classroom control, but also include the need for teachers

1. to state that the goals of the course include the fostering of thinking as having high priority.
2. to help students activate prior knowledge and link it to new information
3. to occasionally admit uncertainty and
4. to encourage students to challenge, question and think independently and
5. to give credit for correct process of thinking as well as for the final answer (Garland & Ellett, 1986, p.5).

Among the roles that teachers play in creating classroom climates in order to enhance critical thinking are 1. Interacting, 2. Mediating and 3. Modeling.

- **Interactive role**

Research has demonstrated that certain teacher interactions determine the degree of trust, risk-taking level of cognition, warmth, rapport openness and psychological safety in the classroom (Goodwin, Miller, Cheetham, 1991). Most theoretical studies have arrived at the conclusion that to be most effective in this interactive role, the teacher should be enthusiastic in accepting a more democratic model of social control in the classroom (Schrag, 1988; Weinstein, 1992). The teacher's

role in the classroom should be to help students to state and expand their ideas and to elucidate those ideas until the intended learning becomes clear for them (Walsh & Paul, 1986).

- **Mediator role**

Teachers become the mediators of learning by increasing verbal interaction. Acting as a mediator, the teacher serves like a guide negotiating between the learners, the subject matter to be learned and the context (Marzano, 1988,1992; Schneider, 1996). A mediator acts actively to assist the student interpret the case. The process might involve modeling, coaching, helping students formulate questions, linking new information to prior knowledge as well as explaining how ideas are connected and helping students to develop a positive attitude towards an autonomous thinking and problem solving (Costa & Garmston, 1997a). Teachers shift in their roles from information givers to class director to facilitator and guide of classroom lessons (Costa & Garmston, 1997b; Marzano, 1992,1999).

- **Modeling**

That students acquire much of their behaviour, feelings, attitudes and values through imitation of significant adults in their lives is an established fact (Walsh & Paul, 1986). A model is usually referred as a personality worth for imitating. Teachers model in any curricular and extracurricular activity taking place in the educational premises (Marzano, 1988; 1992). Moreover, instructors display a model reflecting a critical thinking process through their propositions and

intellectual preoccupations (Barell, 1995). One of the main aims of modeling is that teachers demonstrate an overt attitude about their own thinking because as they share approaches in classroom interaction. Because modeling shows a willingness to share teachers' thinking with students, it can be regarded as a first step to inquiry process. Sarason (1996) puts forward a greatest teacher model he remembers and introduces a description of him as "...his unique genius as a teacher was to speculate publicly; in opening the play of his mind to his students. He gave each student a self- assigned role in resolving these questions his teaching dramatized" (p.87).

As it has been already discussed previously, most experts come to the conclusion that thinking involves several components including knowledge, skill and attitude or disposition. Teachers expecting to create classroom settings that enhance critical thinking must themselves demonstrate these dispositions in the classroom (Barell, 1995). If teachers wish their learners to appreciate others' viewpoints, values and differences, they will tolerate each other's differences (Costa et. al. 1985a).

When teachers overtly emphasize the dispositions of thinking, this is called teaching thinking from a hard-liner stand view by Walsh & Paul (1986). For instance, thinking about an issue, or interacting with others about it, a person with these dispositions would probably engage in inner talk as the following:

Let's see, am I clear about what we are discussing here? Why

would he be trying to persuade me to take that position? I don't have all of the facts; I'd better clarify the issue. Am I being open-minded about what he is saying to me, or have I already concluded that he can't be right? I'm starting to be convinced: I'd better modify my original opinion.
(Marzano, 1988, p. 52)

Teachers should make this inner talk phenomenon overt and out loud for the learners to make them conscious of the use or misuse of the dispositions (Walsh & Paul, 1986). To appreciate utilizing rational scientific ways in solving problems, students must observe teachers in the act when problems arise in the classroom setting (Costa & Garmston, 1997a). When teachers exhibit their own problem solving ways to the students, they convey the satisfaction and the disappointment they undergo in finding, analyzing, and working toward solutions to problems and uncertainties in their life and in their field. Barell (1995) terms this type modeling as real time modeling. By reflecting their own difficulties as teachers solve problems, the teacher models the core of the creative process. Moreover, students must observe teachers thinking and teachers should label what they do naturally, as advanced critical thinkers, thus the students become aware of the process.

2.9 Bloom's Taxonomy

The roots of critical thinking theory go as far as the works of Benjamin Bloom who classified learning behaviors in the cognitive field. Bloom (1956) developed a taxonomy of learning objectives for teachers that he clarified and expanded upon over the period of about approximately two decades. His ideas continue to be widely accepted and used in education programs throughout the United States. Bloom classifies learning behaviors according to six levels ranging from Knowledge, which focuses upon recitation of facts, to Evaluation, which requires complex valuing and weighing of information. Each level relates to a higher level of cognitive ability. The following table displays Bloom's Taxonomy:

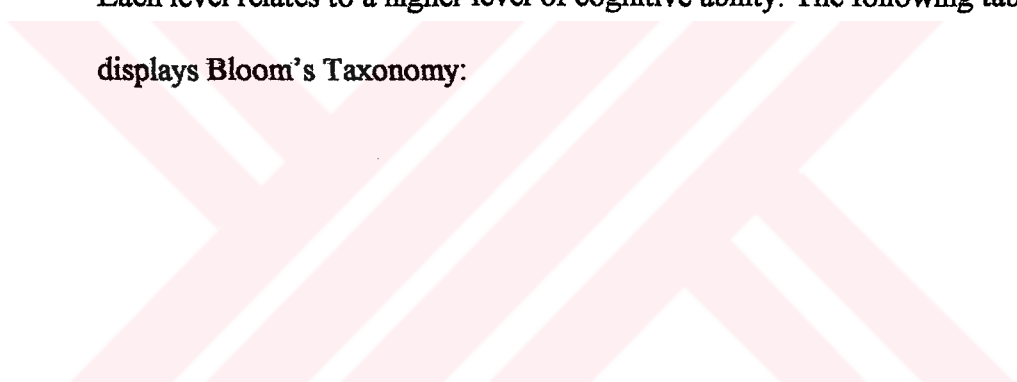


Table 2.1
Bloom's Taxonomy of Learning Objectives

Knowledge	Focuses upon the remembering and reciting of information. Behavioral verbs often linked with this level are: identify, list, label, name, recall, define, locate, recognize, match, and reproduce. Example: The student will list the six levels of <i>Blooms Taxonomy of Learning Objectives</i> in ascending order.
Comprehension	Focuses upon relating and organizing previously learned information. Behavioral verbs often linked with this level are: explain, relate, generalize, predict, summarize, paraphrase, restate, convert, and demonstrate. Example: The student will explain <i>Blooms Taxonomy of Learning Objectives</i> in his or her own words.
Application	Focuses upon applying information according to a rule or principle in a specific situation. Behavioral verbs often linked with this level are: Solve, choose, interpret, make, put together, change, apply, produce, translate, and construct. Example: The student will construct six learning objectives, one from each level of <i>Blooms Taxonomy of Learning Objectives</i>.
Analysis	Critical thinking which focuses upon parts and their functionality in the whole. Behavioral verbs often linked with this level are: Analyze, compare, categorize, take apart, differentiate, examine, subdivide, distinguish and contrast. Example: The student will distinguish which level of <i>Blooms Taxonomy of Learning Objectives</i> is implied in a list of ten learning objectives and
Synthesis	Critical thinking which focuses upon putting parts together to form a new and original whole. Behavioral verbs often linked with this level are: Invent, create, combine, hypothesize, plan, originate, add to, imagine, and forecast. Example: The student will create a lesson plan in which <i>Blooms Taxonomy of Learning Objectives</i> are taught.
Evaluation	Critical thinking which focuses upon valuing and making judgements based upon information. Behavioral verbs often linked with this level are: Assess, recommend, critique, evaluate, criticize, weigh, and value. Example: The student will critique a classroom teacher's questioning behavior for critical thinking elements.

The various categories and processes involved in the diverse thinking levels in *Bloom's Taxonomy* can also be displayed in a simpler manner as follows (Fischer, 1995, p.70).

Category	Thinking Process cues
1 Knowledge (remembering and retaining)	Say what you know, what you remember, describe, repeat, define, identify, tell who, when, which, where, what
2 Comprehension (interpreting and understanding)	Describe in your own words, tell how you feel about, say what it means, explain, compare, relate
3 Application (making use of)	How can you use it, where does it lead you, apply what you know, use it to solve problems, demonstrate
4 Analysis (taking part)	What are the parts, the order, the reasons why, the causes, the problems, the solutions, the consequences
5 Synthesis (putting together)	How might it be different, how else, what if, suppose, develop, improve, create in your own way
6 Evaluation (judging and assessing)	How would you judge it, does it succeed, will it work, what would you prefer, why do you think so

Figure 2.6 A simpler form of Bloom's Taxonomy (Fischer, 1995, p.70)

By utilizing these categories, a teacher can organize or analyze many learning activities, considering the levels of his students he might ask questions shown below when telling a story such as Goldilocks and the Three Bears (Fischer, 1995, p.70).

- | | |
|-----------------|--|
| 1 Knowledge | <i>What happened in the story?</i>
<i>What did Goldilocks do in the Bear's home?</i> |
| 2 Comprehension | <i>Why did it happen that way?</i>
<i>Why did Goldilocks like little Bear's best?</i> |
| 3 Application | <i>What would you have done?</i> |

What would have happened if Goldilocks had come to your house?

4 Analysis

*Which part did you like best?
Which parts could not be true?*

5 Synthesis

*Can you think of a different ending?
What would you have done if you were Goldilocks?*

6 Evaluation

*What did you think of the story?
Was Goldilocks good or bad? Why?*

Fischer (1995) observes that Bloom uses the term *critical thinking* as a synonym of *evaluation* and that he places *evaluation* as the highest of six thinking skills, which he calls the *cognitive goals* of education. This is shown in the following figure:

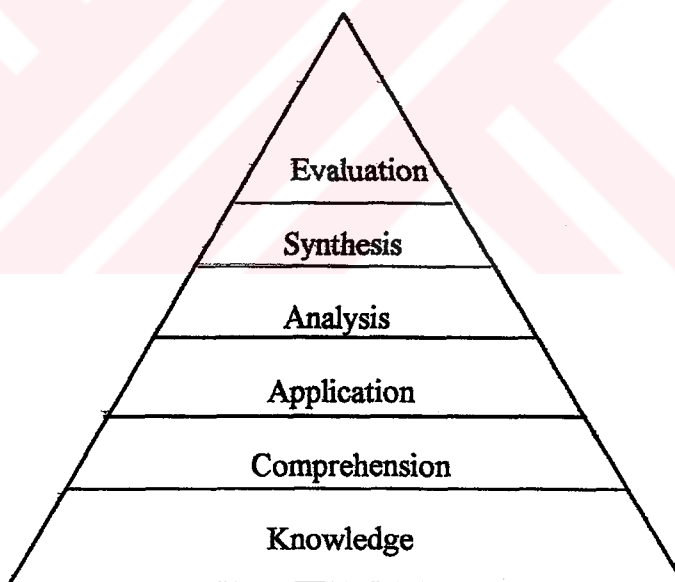


Figure 2.7 Bloom's Taxonomy of cognitive goals (Fischer, 1995, p.69)

Although Bloom's Taxonomy has been widely used in the circles of education for two decades, some scholars, for example, Ennis (1985) argues,

“unfortunately Bloom’s Taxonomy does not provide the guidance that we need” (p.45). Within the same line of thinking, Paul (1985) also finds Bloom’s approach inadequate by stating that “although its usefulness and influence in education is probably unsurpassed, Bloom’s Taxonomy has limitations when it comes to developing critical thinking curriculums” (p.36). In reply to Paul’s criticism, Bloom claims, “ we intend the Taxonomy as a method of classifying educational objectives, educational experiences, learning processes, and evaluation questions and problems. We did not intend to provide a constraint on educational philosophy, teaching methods, or curriculum development ” (Paul, 1985, p.39).

2.10 Critical thinking and language learning

As Fisher and Scriven (1997) have indicated, when we observe animals, we come to a conclusion that they do not require a language to perform their intelligence. Instead, we see that in their behavior of making or choosing tools or in their way of approaching a problem-solving trick simply by observing another member of the group who discovered it. For example,” the wolf approaching a baited trap, and working out how to set it off and then steal the bait is exhibiting critical thinking” (Fisher & Scriven, 1997, p.51). However, critical thinking requires more than the intelligence displayed by the wolf; “it requires the ability to deal with a language more complex than the signals a trainer calls to a sheep dog” (Fisher & Scriven, 1997, p.51). For instance, argumentation is one of the components of critical thinking and it is more than an animal can handle. Dealing with argumentation requires the person to

say something about it and this is materialized through language, oral or written.

A variety of critical thinking skills becomes possible by linguistic knowledge. The authors continue to clarify how linguistic understanding makes it further possible for a person to

... identify and communicate about things like shifts in meaning, essential vagueness in a term which an argument is exploiting, illicit use of slippery slope arguments, errors in deduction, etc., without any factual knowledge... Of course, this isn't all there is to critical thinking - but it's just a very useful slice. Some of these abilities to pick up errors in reasoning are simply part of learning the language (Fisher and Scriven, 1997, p.51)

Indeed, adult L2 learners utilize many language learning strategies which might also play a role causing to enhance their critical thinking skills in general. The following section will deal about language learning strategies employed by effective second and foreign language learners.

2.11 Language learning strategies in SLA

Chamot & Kupper (1989) report the investigations of learning strategies in second language acquisition. These studies have identified the strategies effective language learners use. Furthermore, strategy identification studies (Barnett, 1988; Cohen & Alpey, 1980; Holec, 1987; Hosenfeld et al., 1981; O'Malley et al., 1985b; Wenden, 1987 in Chamot & Kupper, 1989) have

revealed that efficient language learners make use of a variety of suitable strategies in the language learning process whereas less successful learners do not seem to use those strategies frequently or select appropriate language learning strategies. Oxford and Crookall (1989) present some language learning strategies (LLSs) employed by learners to progress toward proficiency in a second or foreign language. Among these LLSs are:

- ***Cognitive Strategies***- skills that involve manipulation or transformation of the language in some direct way, e.g., through reasoning, analysis, note taking, functional practice in naturalistic settings formal practice with structure and sounds.etc.
- ***Memory Strategies***- techniques specifically tailored to help the learner store new information and retrieve it later.
- ***Compensation Strategies***- behaviors used to compensate for missing knowledge of some kind, e.g., inferencing (guessing) while listening or reading, or using synonyms or circumlocution while speaking or writing.
- ***Communication Strategies***-typically taken to mean only those compensation strategies used while speaking; however communication occurs in the three other language skill areas (reading, listening, and writing) as well as in speaking, so the popular term *communication* is a misnomer.
- ***Metacognitive Strategies***- behaviors used for centering, arranging, planning, and evaluating one's learning. These "beyond -the -cognitive" strategies are used to provide "executive control" over the learning process.
- ***Affective Strategies***- techniques like-self reinforcement and positive self-talk which help learners gain better control over their emotions, attitudes, and motivations related to language learning.
- ***Social Strategies***- actions involving other people in the learning process. Examples are questioning, cooperating with peers, and developing empathy

(Oxford & Crookall, 1989, p.410)

Individuals at all levels seem to use these strategies at all levels in their foreign language learning process. Chamot and Kupper (1989) report that students at the higher levels of language study use more language learning strategies than do beginning level students. Learners at the beginning level rely most on the cognitive strategies such as repetition, translation, and transfer. However, at the intermediate and advanced levels they begin to depend increasingly on *inferencing* as well as strategies such as repetition and translation.

Some of these strategies, for example Cognitive Strategies, Compensation Strategies, Metacognitive Strategies, and Social Strategies mentioned above, are very similar to the properties of critical thinking. In addition to these, the findings of a three year project by Chamot and Kupper (1989) reveal that language learning strategies utilized by foreign language students match with the subsets of the WGCTA. Table 2.2 below illustrates the learning strategies and their definitions:

Table 2.2
Learning Strategies and Their Definitions

Metacognitive strategies involve thinking about the learning process, planning for learning, monitoring the learning task, and evaluating how well one has learned.

1. *Planning*: Previewing the organizing concept or principle or an anticipated learning task ("advance organizer"); proposing strategies for handling an upcoming task; generating a plan for the parts, sequence, main ideas, or language functions to be used in handling a task.
2. *Directed Attention*: Deciding in advance to attend in general to a learning task and ignore irrelevant distractors; maintaining attention during task execution.

3. *Selective Attention*: Deciding in advance to attend to specific aspect of language input or situational details that assist in performance of a task; attending to specific aspects of language input during task execution.
4. *Self-management*: Understanding the conditions that help one successfully accomplish language tasks and arranging for presence of those conditions; controlling one's language to maximize use of what is already known.
5. *Self-monitoring*: Checking, verifying, or correcting one's comprehension or performance in the course of a language task. This has been coded in the think alouds in the following way;
 - *Comprehension* monitoring: checking, verifying or correcting one's understanding
 - *Production* monitoring: checking, verifying, or correcting one's language production
 - *Auditory* monitoring: using one's "ear" for the language (how something sounds to make decisions)
 - *Visual* monitoring: using one's "eye" for the language (how something looks to make decisions)
 - *Style* monitoring: checking, verifying or correcting based upon an internal stylistic register
 - *Strategy* monitoring: tracking news of how a strategy is working
 - *Plan* monitoring: checking how well a plan is working
 - *Double Check* monitoring: tracking across the task previously undertaken acts or possibilities considered
6. *Problem Identification*: Explicitly identifying the central point needing resolution in a task, or identifying an aspect of the task that hinders its successful completion.
7. *Self-evaluation*: Checking the outcomes of ones own language performance against an internal measure of completeness and accuracy; checking one's language repertoire, strategy use or ability to perform the task at hand. This has been coded in the think aloud as:
 - *Production* evaluation: checking one's work when the task is finished
 - *Performance* evaluation: judging one's overall execution of the task
 - *Ability* evaluation: judging one's ability to perform the task
 - *Strategy* evaluation: judging one's strategy use when the task is completed
 - *Language Repertoire* evaluation: judging how much one knows of the L2, at the word, phrase, sentence or concept level.

Cognitive strategies involve interacting with the material to be learned, manipulating the material mentally or physically, or applying a specific technique to a learning task.

1. *Repetition*: Repeating a chunk of language (a word or phrase) in the course of performing a language task.
2. *Resourcing*: Using available reference sources of information about the target language, including dictionaries, textbooks and prior work.

3. *Grouping*: Ordering classifying, or labeling material used in a language task based on common attributes; recalling information based on grouping previously done.
4. *Note taking*: Writing down key words and concepts in abbreviated verbal, graphic, or numerical form to assist performance of a language task.
5. *Deduction/Induction*: Consciously applying learned or self-developed rules to produce or understand the target language.
6. *Substitution*: Selecting alternative approaches, revised plans, or different words or phrases to accomplish a language task.
7. *Elaboration*: Relating new information to prior knowledge; relating different parts of new information to each other; making meaningful personal associations to information presented. This has been coded in the think aloud data in the following ways:
 - *Personal* elaboration: Making judgments about reacting personally to the material presented
 - *World* elaboration: Using knowledge experienced in the world
 - *Academic* elaboration: using knowledge gained in academic situation
 - *Between parts* elaboration: relating parts of the task to each other
 - *Questioning* elaboration: Using combination of questions and world knowledge to brainstorm logical solutions to a task
 - *Self-evaluative* elaboration: Judging self in relation to materials
 - *Creative* elaboration: Making up a story line, or adapting a clever perspective
 - *Imagery*: Using mental or actual pictures or visuals to represent information; coded as a separate category, but viewed as a form of elaboration.
8. *Summarization*: Making a mental or written summary of language and information presented in a task
9. *Translation*: Rendering ideas from one language to another in a relatively verbatim manner
10. *Transfer*: Using previously acquired linguistic knowledge to facilitate a language task
11. *Inference*: Using available information: to guess the meaning or usage of unfamiliar language items associated with a language task; to predict outcomes; or to fill in the missing information.

Social and affective strategies involve interacting with another person to assist learning, or using effective control to assist a learning task.

1. *Questioning*: Asking for explanation, verification, rephrasing, or examples about the material; asking for clarification or verification about the task; posing questions to the self.
2. *Cooperation*: Working together with peers to solve a problem, pool information, check a learning task, model a language activity, or get feedback on oral or written performance.
3. *Self-talk*: Reducing anxiety by using mental techniques that make one feel competent to do the learning

4. *Self-reinforcement*: Providing personal motivation by arranging rewards for oneself when a language learning activity has been successfully completed.
-

(Chamot and Kupper, 1989, pp.16-17)

Based on the studies above, we can restate that some language learning strategies individuals employ in SLA reveal a relationship to critical thinking attributes.

2.12 Listening and discussion lead to growth in critical thinking

Research carried out by Lockwood and Harris (1985) has revealed that university level students who participate in lessons focused on discussion are more likely to enhance better reasoning skills than those who do not. Students engaging in classes where discussion is encouraged are likely to benefit in the following areas, which in turn might lead to become effective critical thinkers:

1. Better able to express coherent and justified points of view about responsible action
2. Develop more complex and systematic reasoning
3. Gain deeper understanding of issues
4. Increase their ability to express clearly reasoned judgments
5. Become more effective participants in productive discussions

(Lockwood & Harris, 1985, p.86)

Barell (1995) has also indicated that discussion is an important device for developing thinking skills. By discussion students also have chance to improve their listening skills, a prerequisite to a well developed discussion. Barell (1995) suggests that:

If we spent the better part of the course helping students to listen to each other, we could do much to enhance tendencies to question and respond to each other intelligently. Persons who listen well, who can receive another's message, who relate what the other person knows, who understand the reasoning behind the message and put themselves in another's shoes are able to respond thoughtfully in a discussion. Listening is a prerequisite to becoming more of an emphatic person.

(Barell, 1995, p.107)

Teachers may enhance critical thinking of their students more by creating an atmosphere for discussion, explanation, asking higher order level questions and stimulating cognitive processes in their classes than simply by lecturing or having students working quietly on their own (Brookfield, 1999; Gage, 1997). When teachers utilize these tools in their classes, students may develop their skills of discussion, language production, listening and intellectual stimulation (Brookfield, 1999; Costa & Lowery, 1989).

Costa (1991b) further emphasizes the importance of the ability to listen to other people, to understand their point of view and to empathize with them. He also believes that this ability "is one of the highest forms of intelligent behavior" (p.101).

2.13 Second language learning as a cognitive process

As mentioned previously, learning a second language is considered as the acquisition of a complex process and that learning a language requires

learning a skill (McLaughlin, 1989). This cognitive process is assumed to include internal representations by which performance is guided and regulated.

McLaughlin (1989) states that

...in the case of language acquisition, these representations are based on the language system and include procedures for selecting appropriate vocabulary, grammatical rules, and pragmatic conventions governing language use. As performance improves, there is constant restructuring as learners simplify, unify, and gain increasing control over their internal representations.

(McLaughlin, 1989, pp.133-134)

In acquiring complex skills, such as learning a second language, learners develop new structures for interpreting (a subcomponent in the WGCTA) new information and for imposing a new organization on information already accumulated (Cheng, 1985 in McLaughlin, 1989).

According to the Cognitive Theory, the process of learning a second language, just like any other cognitive skill, for example critical thinking, involves the gradual combination of skills. McLaughlin (1989) points out that “the initial stages of learning involve the slow development of skills and gradual elimination of errors as the learner attempts to automatize aspects of performance” (p.138). He also indicates that in later stages, learners continue to restructure their internal representations.

Faerch and Kaspar (in McLaughlin, 1989) related the difference between declarative and procedural knowledge to second-language learning

processes. Internalized rules and memorized chunks of the language comprise the 'what' of the learner's system, in other words, his *declarative* knowledge. Whereas *procedural knowledge* constitutes knowing 'how' to utilize strategies and procedures to process second language data for the purpose of acquisition and use. Procedural knowledge explains how learners store and automatize rules and how they reorganize their internal representations to match the target language.

Ellis (1985b), inspired by the work of Faerch and Kasper (1983, in McLaughlin, 1989) classified the processes involved in using second-language knowledge into learning, production, and communicative strategies. While learning strategies refer to procedural learning rather than its use, production and communicative strategies relate to language use.

Table 2.3 below demonstrates a typology of learner strategies based on Ellis (1985b, in McLaughlin, 1989, p.144). Language strategies are subdivided into simplification strategies, inferencing, hypothesis-testing strategies and, and practice. Simplification strategies comprise overgeneralization and transfer while inferencing include those inferences based on intralingual factors and those which are based on extralingual characteristics of physical environment. Production strategies cover planning and correcting strategies.

These strategies include semantic simplification, in other words, the reduction of propositional components that are linguistically coded and linguistic simplification, that is omitting form words and affixes. As for communication strategies, they comprise reduction and achievement strategies. Reduction strategies can be formal, for example, the avoidance of certain

second language rules or functional, that is the avoidance

Table 2.3

A typology of learner strategies

Type of strategy	Examples
Learning strategies	Simplification 1. Overgeneralization 2. Transfer Inferencing 1. Intralingual 2. Extralingual Hypothesis testing- strategies Practice
Production strategies	Planning strategies 1. Semantic simplification 2. Linguistic simplification Correcting strategies
Communication strategies	Reduction strategies 1. Formal 2. Functional Achievement strategies 1. Compensatory 2. Retrieval

(Ellis 1985b, in McLaughlin, 1989, p.144)

of certain speech acts or discourse functions. Achievement strategies on the other hand include compensatory strategies which mainly contain replacements or substitutions of forms or functions. Finally, retrieval strategies are utilized when the learner encounters a problem locating the required item but decides to persevere instead. In other words the learner continues performing the same action over and over again rather than making use of compensatory strategies.

As mentioned earlier in the introduction chapter, at later phases in second language learning development, inferencing strategies prevail as learners deal more closely with input data. Hypotheses, for example, are tested in a number of ways (Faerch and Kasper, 1983 in McLaughlin, 1989, p. 146).

1. *Receptive hypothesis testing*: the learner attends to the input and compares hypothesizes with the data provided by speakers of the target language.
2. *Productive hypothesis testing*: the learner produces utterances in the second language and assesses their correctness through feedback received.
3. *Metalingual hypothesis testing*: the learner consults a native speaker, a teacher, grammar, or dictionary to validate a hypothesis.
4. *Interactional hypothesis testing*: the learner elicits a repair from a native speaker.

2.14 Socio-economic-status (SES) and critical thinking

Cheung (2001) found that class background may indirectly have an impact on the student's academic performance as well as critical thinking. The same study reports that the students of 'bourgeois or upper class families' did extremely well in critical thinking when compared with students of lower classes. Additionally, the students from 'bourgeois or upper class' families performed higher critical thinking than students of 'lower class.' Wright (1994 in Cheung, 2001) states that an individual's class depends on the individual's occupation, and that income is not a standard to define classes. Besides class background, parents'

meditative role appears to be important as children tend to learn and generalize from their parents' words and manners.

Moreover, Sigel (1991) acknowledges parental influence on children's intellectual development by focusing on the following:

...children whose parents conform to social convention do less well on problem-solving and thinking tasks than do children whose parents are more progressive and democratic. Children who come from impoverished homes where parents have little education do less well on intellectual assessments and school performance than children from more privileged homes.

(Sigel, 1991, p.44)

The studies above demonstrate that there is a clear influence of family background on critical thinking. Also parental education has an impact on children's intellectual development as well as critical thinking.

CHAPTER III

METHODOLOGY

3.1 Introduction

In this chapter the research method is presented. Information on selection participants and their general background is presented in Section 3.2. The instruments used in measuring the critical thinking skills and the English of the level participants in all four groups are explained in Section 3.3; finally, the procedure utilized during the study is given in Section 3.4.

3.2 Participants

In order to test the proposed hypotheses, 240 participants from a population of 690 were randomly selected from the English Language Teaching (ELT) Department and Primary School Teacher Education (PSTE) Department of the Faculty of Education, Çukurova University. The Michigan Test of English Language Proficiency (MTELP) determined the participants' level of English. The participants were then categorized as "false beginners group" (FBG), "beginners group" (BG), "intermediate group" (IG), and "advanced group" (AG). In addition, data obtained through a Personal Information Background Questionnaire (PIBQ) was another a determining factor in forming the four groups.

In each group, there were 60 members. While prospective primary school teachers formed the false beginners, the beginner, the intermediate, and the

advanced groups were comprised of students from the ELT Department majoring English. Among the 240 participants, 72 were males and 168 were females.

Table 3.1

Background information on the subjects

Department	Gender	# of participants
ELT	Male	28
	Female	92
PSTE	Male	46
	Female	74

In Table 3.2, background information of the participants is displayed in more detail. As demonstrated in this table, only 52 students were the graduates of state high schools and the total number of Anatolian high school graduates was 188.

As illustrated in Table 3.2, 43 of the participants in the FBG were of state high schools graduates while only 17 were of graduates Anatolian high schools. As for the BG, the number of ordinary state high school graduates as illustrated in Table 3.2, was only 52. As for the BG, the number of high school graduates was just nine while the number of Anatolian high school graduates was 51. It is interesting to note that neither the IG or the AG contained graduates of state high schools. In other words, all participants in both the IG and the AG consisted of only Anatolian high school graduates.

Table 3.2

The general background of the subjects

Subjects		False Beginners	Beginners	Intermediate	Advanced	Total
High School	Ordinary state	43	9	0	0	52
	Anatolian state	17	51	60	60	188
Own private room	Yes	40	27	50	32	149
	No	20	33	10	28	91
Reading daily newspaper	Yes	38	34	57	48	177
	No	22	26	3	12	63
Computer Literacy	Yes	49	37	53	56	197
	No	11	23	5	4	43
Mother's education	Illiterate	7	4	0	0	11
	Primary School	39	29	6	21	95
	Secondary School	5	17	8	4	34
	High School	8	10	36	17	71
	University	1	0	10	18	29
Father's education	Illiterate	0	0	0	0	0
	Primary School	28	21	2	8	59
	Secondary School	11	18	3	5	37
	High School	15	18	27	20	80
	University	6	3	28	27	64
Number of siblings	The only child	0	0	1	4	5
	One sibling	3	5	30	22	60
	2-5 siblings	30	40	28	32	130
	6 or more siblings	27	15	1	2	45

The next point we wanted to discover about our subjects was to find out whether or not they had study rooms of their own in their homes.

The same situation applies to the AG, as well. In this group, 32 participants had private rooms and 28 did not. However, the number of private room owners in the IG is greater than the number of those who do not have rooms of their own. While 40 members in the FBG had private rooms, 20 did not. In the BG, however, the number of participants owning private rooms was 27 and the number of those who did not was 33.

Another point in the questionnaire aimed to find out the subjects' newspaper reading habits. In the FBG while 38 students had the habit of reading daily newspapers, 22 participants reported that they did not read daily newspapers. The number of participants with newspaper reading habit in the BG was 34, but the number of the participants who did not have this habit was 26. The majority of the subjects in the IG on the other hand, seemed to read the most of all the groups. Many of the participants in the AG also appeared to read newspapers on a daily basis. To sum up, we can say that one third of our participants stated that they did not read daily newspapers. Therefore, this variable may not be counted as an effect on their critical thinking ability.

According to Table 3.2, computer literacy is fairly high among the subjects. Almost all the subjects in the IG and AG seemed to be computer literate. Despite such indication, however, we observed that this rate was much lower in the FBG and the BG.

Examination of Table 3.2 shows that mother's education of our subjects is rather diverse. It is surprising to note that 11 mothers of our participants

were illiterate and that only 29 were university graduates. Almost all of the university graduate mothers fall into the IG and AG while just one was in the FBG group and none were in the BG.

As Table 3.2 reveals, father's education of our subjects differs from mother's education in that illiteracy is not observed among fathers. While 59 of fathers had only primary school education, the number of university graduate fathers surpassed the number of mothers with university level education, 64 and 29 respectively. A great majority of the fathers with university degree were among fathers of our subjects in the IG and AG. Although a total number of 49 fathers in the FBG and BG had just primary school education, this number fell dramatically down with the IG and AG to just 10. Whereas the number of high school graduate fathers in the FBG and BG was only 33, this number was 47 with the fathers of IG and AG level participants.

The last item to look at in Table 3.2 is the number of siblings of the subjects participated in the study. As clearly demonstrated in the table, five of our subjects were the only children of their families and these students were among the members of the IG and AG. While eight participants had one sibling in the FBG and BG, this number in the IG and AG was 52. The number of participants having siblings between two and five among the FBG and BG was 70 whereas in the IG and the AG it was 60. The participants in the four groups were similar to each other in that, they all had siblings changing between two and five. Although the number of participants having six or more siblings in the FBG and BG was 42, this number was only three with the IG and AG.

3.3 Instrumentation

Instruments utilized in this research were MTELP and WGCTA. As was previously described, (see Chapter I) the total number of questions answered correctly out of 80 questions measured the subjects' general critical thinking ability. In addition to these tests, a Personal Background Information Questionnaire (PBIQ) (see Appendix I, p.140) was used to find out the personal variables of the subjects.

3.3.1 The Michigan Test of English Language Proficiency

The MTELP (Form Q) contains 100 items. These are divided into three parts: Part I is a grammar test; Part II is a vocabulary test; and Part III is a test of reading comprehension. The test is published by the Division of Testing and Certification, English Language Institute, the University of Michigan. Time allocated for the entire test was 75 minutes. The listening part is a 45-item, a 15-minute tape-recorded listening test used to estimate a student's ability to comprehend orally presented basic English structures.

3.3.2 The Watson-Glaser Critical Thinking Appraisal (WGCTA)

Watson-Glaser Critical Thinking Appraisal was used to measure the dependent variable, critical thinking ability. The WGCTA is a broadly utilized instrument developed to measure critical thinking of individuals ranging from grade 4 to college students and adults. As suggested by the WGCTA (1980, p.2) manual, it tests individuals' critical thinking abilities in the areas of

making inferences, recognition of assumptions, deductions, interpretations, and evaluation of arguments.

The following are the five subsets of the **Watson-Glaser Critical Thinking Appraisal**:

Test 1. Inference. Discriminating among degrees of truth or falsity of inferences drawn from given data.

Test 2. Recognition of Assumptions. Recognizing unstated assumptions or presuppositions in given statements or assertions.

Test 3. Deduction. Determining whether certain conclusions necessarily follow from information in given statements or premises.

Test 4. Interpretation. Weighing evidence and deciding if generalizations or conclusions based on the given data are warranted.

Test 5. Evaluation of arguments. Distinguishing between arguments that are strong and relevant and those that are weak or irrelevant to a particular question at issue (WGCTA, 1980b, p.2).

Although each of the subsets of the WGCTA is to some extent interrelated, the test was developed to measure a different skill involved in critical thinking. The WGCTA test comes in forms A and B and each form consists of 80 multiple-choice items. The exercises in the test include problems, statements, arguments, and interpretations of data similar to those that are encountered on a daily basis at work, in the classroom, and in newspaper and magazine articles.

It is up to the examiner to decide in advance whether the test is to be timed or not. The Critical Thinking Appraisal is intended as a test of power

rather than speed, therefore a 40-minute period of working time is found to be sufficient.

3.3.3 The Personal Background Information Questionnaire (PBIQ)

The questionnaire comprises three main sections regarding the participant, his/her parents, and/or siblings. It aimed at eliciting information on the socio-economic situation (SES) of the participants. It attempted to seek the subjects' habits of reading daily newspapers; their computer literacy; type of their secondary school education; level of education of their parents; number of siblings and so on. Since all of the participants were native speakers of Turkish, the questionnaire was administered in Turkish.

3.4 Procedure

The accessible population in this descriptive study was 690 students from the departments of ELT and PSTE. We formed the sample out of this population by cluster sampling based on the results of the MTELP. There were four groups, each containing 60 participants (with a total of 240). The PSTE students formed the FBG, whereas, participants from the ELT Department formed the BG, IG and AG.

Participants were administered two standard tests. The first test aimed at measuring the level of English Language proficiency of the participants in areas of general grammar, vocabulary, reading, and listening comprehension.

The second test, WGCTA, was given in order to determine the participants' critical thinking skills. Permission for translating the WGCTA

into Turkish was secured by signing a contract between the publisher, The Psychological Corporation, Harcourt Brace & Company, and the researcher. Having secured the permission, the test was then translated into Turkish by three different scholars. Then these three versions were compared and discussed by the committee until a final version was agreed upon. As was part of the contract, the final version was back- translated and sent back to the publisher. After receiving an approval from the publisher, we administered the Turkish version of the WGCTA.

The reason for the translation and adaptation of the test into Turkish was to eliminate any linguistic and cultural barrier encountered by the participants during the administration of the test. Since all of the subjects were Turkish language native speakers and the PSTE group had no or very little knowledge of the English language, the researcher conducted the Turkish version of the WGCTA.

Before the administration, the participants were told that it was for their good to respond to the items in the test since it aimed to measure their problem solving and thinking abilities rather than their answering speed. Therefore, although the average time for the administration of WGCTA was 50 minutes, some extra time was allotted for those who could not finish on time.

Also, all of the participants were required to answer a PBIQ aiming at gathering additional information about themselves and their families. This was administered on the same session as the WGCTA. It took the participants 5 to 10 minutes to answer the questionnaire.

Finally all the obtained data were entered into Statistical Package for

Social Sciences (SPSS). The comparison of the two tests together with the PBIQ led us to evaluate the relationship between the level of the participants' English language proficiency and critical thinking skills they have. In other words, our dependent variable is the degree of critical thinking ability and the independent variable is the level of English Language proficiency level, namely the FBG, BG, IG and AG. Then, we compared and contrasted the means and the percentiles of the American university students who formed the population of the WGCTA. We obtained this information from the manual of the test.



CHAPTER IV

DATA ANALYSIS

4.1 Introduction

In this chapter, analyses utilized for this study will be presented in order to answer the following research questions:

- Does the level of critical thinking ability increase as the participants' language proficiency level increases?
- Is there a relationship between educational background of parents and the participants' critical thinking?
- In what subset modules of WGCTA do the participants vary in their performance according to their level of L2 proficiency?
- Do Turkish participants' critical thinking ability differ from those of the American university students who formed the population of the WGCTA and whose percentiles and means have been reported in the manual?

The hypotheses derived from the research questions are presented below:

H1: There is a significant increase in the level of critical thinking of the participants as they become more proficient in English.

H2: There is a relationship between the participants' critical thinking ability and their parents' educational background.

H3: The subjects are expected to display dissimilar performance in each of the modules of the WGCTA.

H4: Turkish participants' critical thinking ability differs from those of the American university students who formed the population of the WGCTA and whose percentiles and means have been reported in the manual.

The scores the subjects obtained on the Watson-Glaser Critical Thinking Appraisal were analyzed via ANOVA and Scheffe-F utilizing the Statistical Package for Social Sciences software(SPSS). In order to find out how the four groups vary from each other in terms of general critical thinking abilities, One -way ANOVA analysis of variance and Scheffe-F were applied. The results are analyzed in Section 4.2 in detail.

4.2 The Sub-components of the Watson-Glaser Critical Thinking Test

The sub components of the WGCTA comprises five sections:

- Inference
- Recognition of Assumptions
- Deduction
- Interpretation
- Evaluation of Arguments

Each subcomponent is analyzed with regard to the proficiency levels of the students.

TEST1: INFERENCE

There were three passages consisting of 16 questions in total under this heading. A sample is given below:

DIRECTIONS

An inference is a conclusion that a person can draw from certain observed or supposed facts. For example, if the lights are on in a house and music can be heard coming from the house, we might conclude that someone is at home. But this inference may or may not be right. Perhaps the people in the house did not turn the lights and the radio off when they left the house.

In this test, each exercise begins with a statement of facts that you are to accept as true. *After each statement of facts, several possible inferences are presented. Examine each inference separately, and make your decision about its degree of truth or falseness.*

For each inference you will find abbreviations as T, PT, ID, PF, and F on the answer sheet. T stands for True, PT for Probably True; ID for Insufficient Data; PF Probably False and F stand for False.

SAMPLE

Two hundred students in their early teens willingly attended a recent weekend student conference in a Midwestern city. At this conference, the issues of race relations and means of attaining lasting world peace were argued, because these were the problems the students selected as being most important in today's world.

1. As a group, the students who attended this conference showed a more enthusiastic interest in broad social problems than do most other students in their adolescent ages.
2. The majority of the students had not discussed the conference topics beforehand in their schools.
3. The students came from all over the country.
4. The students discussed mostly labor relation problems.
5. Some teenage students felt it was valuable to discuss problems of ethnic relations and ways of achieving world peace.

Test 1

	T	PT	ID	PF	F
1	☐	☒	☐	☐	☐
2	☐	☐	☐	☒	☐
3	☐	☐	☒	☐	☐
4	☐	☐	☐	☐	☒
5	☒	☐	☐	☐	☐

The data obtained from inference sub section is illustrated in Table 4.1.

As depicted in Table 4.1, the score the False Beginners Group (FBG) obtained (mean=3,55; S.D=1,88) is the lowest of all the groups in this subset of the WGCTA.

Table 4.1

The inference skills of the students

Inference	N	Mean	Std. Deviation
FBG	60	3,5500	1,8814
BG	60	4,8667	1,6821
IG	60	5,9000	1,5913
AG	60	7,4500	1,5990
Total	240	5,4417	2,2080

The low standard deviation of this group (SD=1,88) reveals how homogeneous the group is. These figures are statistically close to those of the BG (mean= 4,86; S.D =1,68). As for the IG, the mean is 5,90 and a standard deviation is 1,59. The AG has the highest mean, 7,45, and its standard deviation is close to the IG's indicating the homogeneity across the scores obtained by the group members. We could say that as the language proficiency of the participants increases, their inference abilities also seem to have a tendency to increase. Here, all of the groups appear to have scored the least in terms of inference when compared with the scores they obtained from the rest of the other subsets of the WGCTA. For this reason, we can possibly propose that the ability of inference is observed as the weakest component for all the groups. The total mean of all the groups is 5.44 while standard

deviation is 2,20. Table 4.2 below illustrates the analysis of variance of the Inference scores obtained from the participants in the four different groups.

Table 4.2

Analysis of Variance for Inference

Inference	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	489,150	3	163,050	56,920	0,000
Within Groups	676,033	236	2,865		
Total	1165,183	239			

We see that the groups are different from each other regarding the grades they received from the Inference component of the WGCTA ($F=56.920$; $p<0.05$).

The source of this difference is found by means of Scheffe-F test and, consequently, mean scores of the four groups have been found significantly varied from each other. We might say that as the participants' foreign language knowledge develops, a corresponding increase is observed in their Inference subset scores.

TEST:2 RECOGNITION OF ASSUMPTION

In this subcomponent, five statements followed by presupposed assumptions were given (with a total of 16) as illustrated in the sample below:

DIRECTIONS

An assumption is something presupposed or taken for granted. When you say, "I'll graduate in June," you take it for granted or assume that you will be alive in June, that your school will judge you to be eligible for graduation in June, and similar things.

Below are a number of statements. Each statement is followed by several proposed assumptions. You are to decide for each assumption whether a person, in making the given statement, is really making that assumption—that is, taking it for granted, justifiably or not.

If you think that the given assumption is taken for granted in the statement, make a heavy black mark under "ASSUMPTION MADE" in the proper place on the answer sheet. If you think the assumption is *not* necessarily taken for granted in the statement, blacken the space under "ASSUMPTION NOT MADE." Remember to judge each assumption independently.

Below is an example. The block at the right shows how these items should be marked on the answer sheet.

EXAMPLE

Statement: "We need to save time in getting there so we'd better go by plane."

Proposed assumptions:

1. Going by plane will take less time than going by some other means of transportation. (It is assumed in the statement that the greater speed of a plane over the speeds of other means of transportation will enable the group to reach its destination in less time.)
2. There is a plane service available to us for at least part of the distance to the destination. (This is necessarily assumed in the statement since, in order to save time by plane, it must be possible to go by plane.)
3. Travel by plane is more convenient than travel by train. (This assumption is not made in the statement-the statement has to do with saving time, and says nothing about convenience or about any other specific mode of travel.)

Test 2	
Assumption	
Made	Not Made
1 ■	□
2 ■	□
3 □	■

In Table 4.3 below, it is observed that all the participants did slightly better at Recognition of Assumption than they did at the Inference subset.

Table 4.3

Recognition of Assumptions

Assumptions			Std.
	N	Mean	Deviation
FBG	60	8,4167	2,0773
BG	60	9,9000	1,6333
IG	60	11,3500	1,2865
AG	60	12,3667	,8823
Total	240	10,5083	2,1356

It is also observed that a gradual improvement in their assumption skills is parallel to their proficiency in English. In this subset, the FBG scored the least with a mean, 8,41 and standard deviation, 2,07. The BG displayed somewhat similar success to the FBG, while the IG obtained less than the AG. When we look at the performance of the AG regarding the ability of recognizing assumptions, we can observe that this group has again received the highest scores. This success corresponds to their English language proficiency level. As can be seen from Table 4.4, the scores our participants obtained from the Recognition of Assumption part of the WGCTA exhibit that the degree of their language knowledge is in conformity with their critical thinking scores ($F=75.672; p<0.05$). In other words, their critical thinking scores increase, as they get more proficient in English. All of the groups participated in the study differ from each other at a significant level regarding critical thinking skills.

Table 4.4

Analysis of Variance for Recognition of Assumptions

Recognition of Assumptions	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	534,417	3	178,139	75,672	,000
Within Groups	555,567	236	2,354		
Total	1089,983	239			

TEST 3: DEDUCTION

In this subsection, there were six premises consisting of suggested conclusions, as illustrated below:

DIRECTIONS

In this test, each exercise consists of several statements (premises) followed by several suggested conclusions. *For the purpose of this test, consider the statements in each exercise as true without exception.* Read the first conclusion beneath the statements. If you think it *necessarily* follows from the statements given, make a heavy black mark under “CONCLUSION FOLLOWS” in the proper place on the answer sheet. If you think it is *not a necessary conclusion* from the statements given, put a heavy black mark under “CONCLUSION DOES NOT FOLLOW”, even though you may believe it be true from your general knowledge.

Likewise, read and judge each of the other conclusions. Try not to let your prejudices influence your judgment—just stick to the given statements (premises) and judge each conclusion as to whether it *necessarily* follows from them.

The word “some” in any of these statements means an indefinite part or quantity of a class of things. “Some” means *at least* a portion, and *perhaps* all of the class. Thus, “Some holidays are rainy” means *at least* one, possibly more than one, and *perhaps* even all holidays are rainy.

EXAMPLE

Some holidays are rainy. All rainy days are boring.

Therefore—

1. No clear days are boring. (The conclusion does not follow. You cannot tell from the statements whether or not clear days are boring. Some may be.)
2. Some holidays are boring. (The conclusion necessarily follows from the statements since, according to them, the rainy days must be boring.)
3. Some holidays are not boring. (The conclusion does not follow even though you may know that some holidays are very pleasant.)

Test 3	
Conclusion	
Follows	Does not follow
1. ☐	☒
2. ☒	☐
3. ☐	☒

Again, it is clearly seen that the score the FBG received is still the lowest of all the groups involved. Furthermore, the score they received from

Deduction is slightly less than the one they obtained from the component of Recognition of Assumption.

Table 4.5

Deduction

Deduction	N	Mean	Std. Deviation
FBG	60	7,9000	2,1129
BG	60	8,6333	1,8683
IG	60	11,1167	1,3912
AD	60	12,6667	1,0523
Total	240	10,0792	2,5264

As for the other groups, we see a gradual increase with their critical thinking abilities corresponding with the level of their English language knowledge. We can also observe that all the groups almost doubled their scores of their Inference subset test of the WGCTA. When we compare the total means of all the groups for the subsets of Recognition of Assumptions and Deduction, we find quite similar results in terms of uniformity of the groups.

Following the application of Scheffe-F test, we understand that there is no difference between the FBG and BG regarding their Deduction abilities.

Table 4.6

Analysis of Variance for Deduction

Deduction	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	876,646	3	292,215	106,285	,000
Within Groups	648,850	236	2,749		
Total	1525,496	239			

On the other hand, when we look at scores of IG and AG, we see that they are significantly different from each other. Otherwise stated, the participants' language proficiency increases gradually as their critical thinking skills increase in a similar fashion ($F=106, 285; p<0.05$).

TEST: 4 INTERPRETATION

There were five short paragraphs followed several suggested conclusions (a total of 16 suggestions). We give a sample below:

DIRECTION

Each exercise below consists of a short paragraph followed by several suggested conclusions. *For the purpose of this test, assume that everything in the short paragraph is true.* The problem is to judge whether or not each of the proposed conclusions logically follows beyond a reasonable doubt *from the information given in the paragraph*. If you think that the proposed conclusion follows beyond a reasonable doubt (even though it may not follow absolutely and necessarily), then make a heavy black mark under “**CONCLUSION FOLLOWS**” in the proper place on the answer sheet. If you think that the conclusion *does not* follow beyond a reasonable doubt from the facts given, then blacken the space under “**CONCLUSION DOES NOT FOLLOW.**” Remember to judge each conclusion independently

EXAMPLE

A study of vocabulary growth in children from eight months to six years old shows that the size of spoken vocabulary increases from zero words at age eight months to 2562 words at age six years.

1. None of the children in his study had learned to talk by the age of six months. (The conclusion follows beyond a reasonable doubt since, according to the statement, the size of the spoken vocabulary at eight months was zero words.)
2. Vocabulary growth is lowest during the period when children are learning to walk. (The conclusion does not follow since there is no information given that relates growth of vocabulary to walking.)

Test 4	
Conclusion	
Follows	Does not Follow
1 ■	□
2 □	■

We infer from Table 4.7 that FBG scored the least at interpreting when compared with the rest of the groups, however the participants in this group performed more than three times better in this component when compared to their performance in Inference.

Table 4.7

Interpretation

Interpretation	N	Mean	Std. Deviation
FBG	60	10,0333	1,8316
BG	60	11,0833	1,5326
IG	60	12,3167	1,3212
AG	60	13,6333	,9382
Total	240	11,7667	1,9694

Moreover, this group gained their highest score again in this subset. Similarly, the BG did much better than they did in the Deduction part of the WGCTA. The mean the AG obtained from Interpretation subset is the highest, 13.63 and standard deviation is ,93.

Table 4.8

Analysis of Variance for Interpretation

Interpretation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	435,500	3	145,167	69,713	,000
Within Groups	491,433	236	2,082		
Total	926,933	239			

Table 4.8 demonstrates that the four groups participating in this study are at a significantly dissimilar to each other regarding their critical thinking skills ($F=106, 285; p<0.05$). Here, we observe an increase in their ability of thinking critically which goes parallel with their level of English language proficiency level as well.

TEST 5: EVALUATING OF ARGUMENTS

There were five questions followed by weak and strong arguments as illustrated in the following sample below:

DIRECTIONS

In making decisions about important questions, it is desirable to be able to distinguish between arguments that are strong and arguments that are weak, as far as the question at issue is concerned. *For an argument to be strong, it must be both important and directly related to the question.*

An argument is weak if it is not directly related to the question (even though it may be of great general importance), or if it of minor importance, or if it is related only to trivial aspects of the question.

Below is series of questions. Each question is followed by several arguments. *For the purpose of this test, you are to regard each argument as true.* The problem then is to decide whether it is a *strong* or *weak* argument.

Make a heavy black mark on the answer sheet under “**ARGUMENT STRONG**” if you think the argument is strong, or under “**ARGUMENT WEAK**” if you think the argument is weak. Judge each argument separately on its own merit. *Try not to let your personal attitude toward the question influence your evaluation of the argument, since each argument is to be regarded as true.*

In the example, note that the argument is evaluated as to how well it supports the side of the question indicated.

EXAMPLE

Should all young men in the United States go to college?

1. Yes; college provides an opportunity for them to learn school songs and cheers. (This would be a silly reason for spending years in college.)
2. No; a large percent of young men do not have enough ability or interest to derive any benefit from college training. (If this is true, as the directions require us to assume, it is a weighty argument against all young men going to college.)
3. No; excessive studying permanently warps an individual's personality. (This argument, although of great general importance when accepted as true, is not directly related to the question, because attendance at college does not necessarily require excessive studying.)

Test 5 Argument		
	Strong	Weak
1	☐	☒
2	☒	☐
3	☐	☒

Table 4.9

Evaluation of Arguments

Evaluation of Arguments	N	Mean	Std. Deviation
False B.	60	9,5667	1,8628
Begin.	60	11,1667	1,7771
Int.	60	12,9333	1,4942
Adv.	60	14,2333	,6731
Total	240	11,9750	2,3303

As can be seen obviously in Table 4.9 above, False Beginners performed in accordance with their language proficiency level with a mean of 9,56 and SD=1,86. As for Beginners, they did slightly better than the former group. Intermediate Group scored higher than both of these previous groups. When we look at the scores of Advanced Group, we see that they gained the highest with a mean of 14,23 and SD=, 67. It is interesting to note that all of the groups displayed the highest performance at Evaluation of Arguments component of all the subsets of the WGCTA.

Table 4.10

Analysis of Variance for Evaluation of Argument

Evaluation of Argument	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	748,317	3	249,439	107,123	,000
Within Groups	549,533	236	2,329		
Total	1297,850	239			

To find out whether the average scores are different across the four groups, a one-way analysis of variance was applied. As a result, a significant difference across the groups is found to be existent ($F=106, 285; p<0.05$). This means that the groups are at different level of language competence that is parallel to their ability of Evaluating Arguments.

Finally, the overall critical thinking scores of the four groups participated in the study are displayed in the following table.

Table 4.11

Overall CT Scores of all the participants

CT	N	Mean	Std. Deviation
TOTAL			
FBG	60	49,0417	3,6124
BG	60	57,0625	3,4431
IG	60	67,0417	4,0125
AD	60	75,5083	1,9045
Total	240	62,1635	10,5573

It is apparent from Table 4.11 that participants with low language proficiency levels, False Beginners and Beginners, performed poorly on WGCTA while participants with higher language proficiency levels, Intermediate and Advanced Groups, outscored the former groups significantly. The total mean of all the groups is 62,16 and SD is 10,55. Another important

point to note here is that all of the groups seem to have scored the least in terms of Inference when compared with the scores they obtained from the rest of the other subset of the WGCTA. We can obviously say the ability of inferring is observed as the weakest component for all the groups. However, all of the groups performed the best at the Evaluation of Arguments, the last subset of the WGCTA.

Table 4.12

Analysis of Variance for Overall CT Scores of all the participants

CT TOTAL	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24005,028	3	8001,676	717,137	,000
Within Groups	2633,241	236	11,158		
Total	26638,268	239			

As it is shown in Table 4.12, False Beginners, Beginners, Intermediate and Advanced groups performed critical thinking abilities in accordance to their English Language proficiency levels ($F=717,137; p<0.05$). All of the groups were significantly different from each other both in terms of their language proficiency level and critical thinking abilities.

4.3 The cross comparison of the Turkish and American university students' critical thinking abilities

When we compared whether the Turkish participants' critical thinking results were similar to those of the American sample (as illustrated in Table 4.13), we saw that these two samples approximately resemble the population of the both groups. Table 4.13 shows the percentile norms of the two groups. The

percentiles of the American students are taken from the WGCTA Manual (1980) in order to match them with those of the Turkish participants. We are aware of the fact that the data are not balanced for sex and number of participants. Moreover, we do not have sufficient background information of the American university students. We just looked at the data for a rough comparison. We are aware of the fact that these two samples may diverge from each other from many aspects. However, taken in combination, for the American group, the percentile value in the table represents the midpoint of a percentile band that extends above and below the designated value. For example, a percentile of 5 falls within the range of percentile band from 45 to 46. An accurate interpretation of such a score is that 5 % of the students tested on the exam earned such score.

When we compute a percentile rank, we locate an individual score in distribution by showing what percent of the scores are below the point. As demonstrated in the following table, the percentile distribution of the two groups is quite similar. We observe a difference at the 50th band after which the scores become higher among the Turkish participants.

Table 4.13

Designated percentiles for
American and Turkish
Participants

%ile	American ss.	Turkish ss.
1	0-42	41,2500
3	43-44	46,2500
5	45-46	46,2500
10	47-48	47,5000
15	49-51	50,0000
20	52	51,2500
25	53	53,7500
30	54	55,0000
35	55-56	56,2500
40	57	57,5000
45	-	60,0000
50	58	61,8750
55	59	63,1875
60	60-61	66,2500
65	62	67,5000
70	63	70,8750
75	64	72,5000
80	65	75,0000
85	66	75,0000
90	67-68	76,2500
95	69-70	76,2500
97	71-74	77,5000
98		77,5000
99	75-80	77,5000
N	175	240
Mean	58.6	62.16
SD	7.8	10.55

In order to see whether the percentiles of the Turkish group were affected by their second language proficiency level, we looked at the same data from group variable perspective and found that the high level of critical thinking ability of the Turkish students stemmed from the high CT scores or high SES percents of the AG and IGs.

Tables from 4.14 to 4.17 illustrate each group's percentiles to determine whether the difference in the percentiles of the American and Turkish groups was due to Turkish students' knowing or not knowing another language or their socio-economic status (SES) or parental education. In the tables, each subcomponent of the WGCTA is given as CT1, CT2, etc. These were the raw scores gained from the subcomponents. In the *CT total* column, we presented the scores, which we then converted to 100 intervals, basing on the Watson scale.

The reason for comparing the percentiles was to find out which group of Turkish participants' performed least well. Tables 4.14 and 4.15 exhibit the percentiles of the advanced and intermediate level Turkish students. The 99th percentile of the advanced and intermediate level participants falls within the range of 80. The differences in mean scores among these two groups (AG & IG) and the American students are in the expected direction. In other words, the higher the proficiency level of the Turkish participants is, the higher the average score on the critical thinking appraisal . Or this may have stemmed from the SES or parental education variables of the Turkish participants or both (proficiency level and/or SES).

Table 4.14
Percentiles of the advanced group(AG)

%ile	CT1	CT2	CT3	CT4	CT5	CT total
1	3,0000	10,0000	10,0000	11,0000	12,0000	66,2500
3	4,6600	10,8300	10,8300	11,8300	12,8300	69,3625
5	5,0000	11,0000	11,0000	12,0000	13,0000	72,5000
10	6,0000	11,0000	11,0000	12,0000	13,1000	73,7500
15	6,0000	11,0000	12,0000	13,0000	14,0000	75,0000
20	6,0000	12,0000	12,0000	13,0000	14,0000	75,0000
25	6,0000	12,0000	12,0000	13,0000	14,0000	75,0000
30	7,0000	12,0000	12,0000	13,0000	14,0000	75,0000
35	7,0000	12,0000	12,0000	13,0000	14,0000	75,0000
40	7,0000	12,0000	12,0000	14,0000	14,0000	75,0000
45	7,0000	12,0000	12,4500	14,0000	14,0000	75,0000
50	7,0000	12,0000	13,0000	14,0000	14,0000	76,2500
55	7,0000	13,0000	13,0000	14,0000	14,0000	76,2500
60	8,0000	13,0000	13,0000	14,0000	14,0000	76,2500
65	8,0000	13,0000	13,0000	14,0000	14,6500	76,2500
70	8,0000	13,0000	13,0000	14,0000	15,0000	76,2500
75	8,0000	13,0000	14,0000	14,0000	15,0000	76,2500
80	9,0000	13,0000	14,0000	14,0000	15,0000	76,2500
85	9,8500	13,0000	14,0000	14,0000	15,0000	77,3500
90	10,0000	13,0000	14,0000	14,9000	15,0000	77,5000
95	10,0000	14,0000	14,0000	15,0000	15,0000	77,5000
97	11,0000	14,0000	14,0000	16,0000	15,0000	77,9250
98	11,0000	14,0000	14,0000	16,0000	15,0000	79,4500
99	11,0000	14,0000	14,0000	16,0000	15,0000	80,0000

Among the subcomponents of the appraisal, these two groups earned the highest means from CT 4 and CT 5 parts. The lowest grades rooted from Inference(CTI) part. We may infer from the tables that the weakest part of the

Table 4.15.

Percentiles of the intermediate group

%ile	CT1	CT2	CT3	CT4	CT5	CT total
1	2,0000	8,0000	8,0000	9,0000	9,0000	60,0000
3	2,8300	8,8300	8,0000	9,8300	9,0000	60,0000
5	3,0500	9,0000	8,0500	10,0000	9,0000	61,2500
10	4,0000	10,0000	9,0000	10,0000	11,0000	61,3750
15	4,1500	10,0000	10,0000	11,0000	11,1500	62,5000
20	5,0000	10,0000	10,0000	11,0000	12,0000	62,5000
25	5,0000	11,0000	10,0000	11,2500	12,2500	63,7500
30	5,0000	11,0000	10,3000	12,0000	13,0000	64,1250
35	5,0000	11,0000	11,0000	12,0000	13,0000	65,0000
40	5,0000	11,0000	11,0000	12,0000	13,0000	66,2500
45	5,0000	11,0000	11,0000	12,0000	13,0000	66,2500
50	6,0000	11,0000	11,0000	13,0000	13,0000	67,5000
55	6,0000	11,0000	11,0000	13,0000	13,0000	67,5000
60	6,0000	11,6000	11,6000	13,0000	14,0000	67,5000
65	7,0000	12,0000	12,0000	13,0000	14,0000	68,7500
70	7,0000	12,0000	12,0000	13,0000	14,0000	68,7500
75	7,0000	12,0000	12,0000	13,0000	14,0000	70,0000
80	7,0000	12,8000	12,0000	13,0000	14,0000	71,2500
85	7,0000	13,0000	12,8500	13,8500	14,0000	72,3125
90	8,0000	13,0000	13,0000	14,0000	14,0000	72,5000
95	8,0000	13,9500	13,0000	14,0000	15,0000	73,6875
97	9,3400	14,0000	14,0000	15,0000	15,0000	75,2125
98	10,5600	14,0000	14,0000	15,0000	15,0000	75,9750
99	11,0000	14,0000	14,0000	15,0000	15,0000	76,2500

Turkish participants is their inferring ability and the strongest component is the evaluation of arguments(CT5) part.

Tables 4.16 and 4.17 illustrate the means and the percentile of the FBG and BG. We observe a difference among the groups.

Table 4.16.

Percentiles of beginners

%ile	CT1	CT2	CT3	CT4	CT5I	CT total
1	1,0000	6,0000	5,0000	8,0000	7,0000	47,5000
3	1,8300	6,0000	5,0000	8,0000	7,8300	49,5750
5	2,0000	7,0000	5,0500	8,0000	8,0500	51,2500
10	2,1000	8,0000	6,0000	9,0000	9,0000	52,6250
15	3,0000	8,0000	6,1500	10,0000	9,0000	53,7500
20	3,0000	9,0000	7,0000	10,0000	9,2000	54,0000
25	4,0000	9,0000	7,2500	10,0000	10,0000	55,0000
30	4,0000	9,0000	8,0000	10,0000	10,0000	55,0000
35	4,0000	9,0000	8,0000	10,0000	10,0000	55,4375
40	5,0000	10,0000	8,0000	11,0000	10,4000	56,2500
45	5,0000	10,0000	8,4500	11,0000	11,0000	56,2500
50	5,0000	10,0000	9,0000	11,0000	11,0000	57,5000
55	5,0000	10,0000	9,0000	11,0000	12,0000	57,5000
60	5,0000	10,0000	9,0000	12,0000	12,0000	57,5000
65	6,0000	10,6500	9,0000	12,0000	12,0000	57,5000
70	6,0000	11,0000	9,7000	12,0000	12,0000	58,7500
75	6,0000	11,0000	10,0000	12,0000	12,7500	59,6875
80	6,0000	11,0000	10,0000	12,0000	13,0000	61,0000
85	6,8500	12,0000	10,0000	12,8500	13,0000	61,2500
90	7,0000	12,0000	11,0000	13,0000	13,0000	62,3750
95	8,0000	12,0000	12,0000	14,0000	14,0000	62,5000
97	8,0000	13,0000	13,0000	14,0000	14,1700	62,7125
98	8,0000	13,0000	13,0000	14,0000	14,7800	63,4750
99	8,0000	13,0000	13,0000	14,0000	15,0000	63,7500

Table 4.17.

Percentiles of the false beginners

%ile	CT1	CT2	CT3	CT4	CT5I	CT total
1	,0000	3,0000	3,0000	6,0000	6,0000	40,0000
3	,0000	3,8300	3,8300	6,0000	6,8300	41,0375
5	1,0000	5,0000	4,0500	7,0000	7,0000	41,3125
10	1,0000	6,0000	5,0000	8,0000	7,0000	45,1250
15	2,0000	6,0000	6,0000	8,0000	7,0000	46,2500
20	2,0000	7,0000	6,0000	9,0000	8,0000	46,2500
25	2,0000	7,0000	6,2500	9,0000	8,0000	46,5625
30	2,0000	7,3000	7,0000	9,0000	9,0000	47,5000
35	3,0000	8,0000	7,0000	9,0000	9,0000	47,5000
40	3,0000	8,0000	7,0000	9,0000	9,0000	48,0000
45	3,0000	8,0000	7,4500	9,4500	9,0000	48,7500
50	3,0000	8,0000	8,0000	10,0000	9,0000	48,7500
55	3,0000	8,0000	8,0000	10,0000	10,0000	50,0000
60	4,0000	8,6000	8,0000	11,0000	10,0000	50,0000
65	4,6500	9,6500	9,0000	11,0000	10,0000	50,8125
70	5,0000	10,0000	9,0000	11,0000	11,0000	51,2500
75	5,0000	10,0000	10,0000	11,0000	11,0000	51,2500
80	5,0000	10,0000	10,0000	12,0000	11,0000	51,2500
85	6,0000	11,0000	10,0000	12,0000	11,0000	52,5000
90	6,0000	11,0000	10,0000	12,0000	12,0000	53,7500
95	6,9500	12,0000	11,0000	13,0000	13,0000	53,7500
97	7,1700	12,1700	13,0000	14,0000	13,1700	55,8500
98	7,7800	12,7800	13,0000	14,0000	13,7800	58,9000
99	8,0000	13,0000	13,0000	14,0000	14,0000	60,0000

For example, the 99th percentile of the BG and FBG was 63-60 respectively; whereas, this band was between 75-80 among the AG / IGs and the American college students.

As for the subcomponents, these two groups performed least well in the CT1 (inference) subcomponent just like the participants from higher language proficiency or SES levels. While the 99th percentile mean was 8 for the BG and FBG in CT1, it was 11 for the AG / IGs. Similarly, these groups scored high in the components of CT4 (interpretation) and CT5 (evaluation of arguments) of the appraisal (WGCTA). This may indicate the necessity of focusing activities that can develop inference ability of our students.

4.4 The relationship between socio economic variables and critical thinking

As Abdullah (1997) claimed, critical thinking disposition may depend on factors such as the parental income, parents' educational level, type of dwelling, number of siblings, and the bilingual background. In this section, we will analyze the data from socio economic background of the students and compare their critical thinking scores with their socio-economic status (SES).

Table 4.18 presents the participants' critical thinking scores and their SES variables.

We infer from Table 4.18 that the type of high school our participants graduated from is a significant variable affecting their total CT scores. While the mean and standard deviation for state high school graduates are 50,57 and 9,45 respectively. For Anatolian high school graduates the mean is 65,36 and standard deviation is 4,47. There is a significant difference between CT scores of Anatolian high school graduates and state high school graduates ($p: ,000$).

Table 4.18

The comparison of CT scores and SES variables

Subjects		False Beginners	Begin.	Inter.	Adv.	
Total CT Scores		49,04	57,06	67,04	75,50	
		N	$\bar{X}$	SD	t	P
High School	State	52	50,57	9,45	10,939	,000
	Anatolian State	188	65,36	4,47		
Own private room	Yes	149	62,14	10,46	-,027	,979
	No	91	62,18	10,77		
Reading daily newspaper	Yes	177	63,71	10,26	3,917	,000
	No	63	57,81	10,22		
Computer literacy	Yes	197	63,18	10,81	3,284	,000
	No	43	57,44	8,12		
					F	P
Mother's education	Illiterate	11	52,38	4,08	16,037	,000
	Primary School	95	58,64	10,94		
	Secondary School	34	60,40	8,81		
	High School	71	65,30	8,82		
	University	29	71,77	7,12		
Father's education	Illiterate	0	0	0	18,994	,000
	Primary School	59	56,12	9,45		
	Secondary School	37	58,54	8,93		
	High School	80	63,36	10,29		
	University	64	68,32	8,93		
Number of siblings	The only child	5	74,25	4,55	23,444	,000
	One sibling	60	68,37	8,22		
	2-5 siblings	130	61,67	10,47		
	6 or more siblings	45	53,94	7,22		

As indicated in Table 4.18, CT scores of Anatolian high school graduates is significantly higher than state high school graduates.

It is demonstrated in Table 4.18 that owning a private room at home has not proved to be a significant variable on the participants' general CT scores.

As for reading daily newspapers, we can see from Table 4.18 that participants having the habit of reading newspapers had a mean of 63,71 and a standard deviation of 10,26. On the other hand, the mean of those without the habit of reading daily newspapers was 57,81 and standard deviation of these participants was 10,22. CT scores of the participants reading newspapers is significantly higher than those of without this habit ($p: ,000$). Thus, we can say that this variable plays a significant role on CT skills.

Computer literacy also significantly influences the participants' CT scores in general. Table 4.18 displays the mean of computer literate participants as 63,18 and standard deviation as 10,81. However, participants with no computer literacy had a mean of 57.44 and standard deviation of 8,12 respectively. As shown in Table 4.18, there is a significant difference between CT scores of computer literate participants and those with no computer literacy. CT scores of the computer literate participants is significantly higher than their counterparts without this skill ($p: ,000$).

Table 4.18 reflects that parental education background is an important factor on students' CT skills. When we compare mothers' education level of our participants, we see that CT scores mean of the participants with illiterate mothers is 52,38. This figure is 58,64 with participants whose mothers are of

primary school education level. Participants whose mothers have secondary school education level have similar mean which is 60,40. As for participants with mothers of high school education level, the mean of their CT scores is 65,30. Participants with university graduate mothers have the highest CT scores mean, 71,77. In order to find out whether the averages were different from each other, we applied one-way ANOVA and the results we received showed that there were significant differences among the groups ($P: ,000$). According to the results we obtained from Post Hoc Tests (Scheffe) analyses, differences regarding CT scores are observed among the participants with mothers of different educational backgrounds, namely, illiterate, primary, secondary, high school and university. When we compare the CT scores of the participants with illiterate mothers, to the scores of the participants with mothers of primary, secondary, high school and university level, we find that participants with high school and university education level mothers scored significantly different than those participants with mothers of primary, and secondary school education level. Comparison of the CT scores of the participants with primary school education level to the participants with high school and university education level revealed that participants with high school and university level mothers scored significantly different than participants with illiterate and secondary school level education. When CT scores of the participants with mothers of secondary school education are compared to those of participants with illiterate, primary school, high school, and university education mothers, we see that the scores of participants with

university level mothers are significantly different. As for CT scores comparison of participants with high school level mothers to participants with mothers of illiterate, primary, secondary and university level illustrate that there is a significant difference among participants with illiterate, primary and university background mothers. Finally, when we compare CT scores of participants with university mothers to participants with illiterate, primary, secondary, and high school education level mothers, we see that a satisficilly significant difference exists among participants with illiterate, primary, secondary, and high school education level mothers.

When we examine fathers' education level of the participants in the study, as demonstrated in Table 4.18, we see that all of the fathers are literate unlike the case with the mothers. However, this fact does not indicate a great difference between CT scores of the participants with either primary or secondary school education level fathers. For example, the means of CT scores of our participants with fathers' educational background as such are 56,12 and 58,54 respectively. On the other hand, CT scores means of the participants with fathers of high school or university education level are slightly higher, 63,36 and 68,32 in the order given. We applied one-way ANOVA to see if the means CT were different from each other. The results of the analysis demonstrated that there were significant differences among the groups with fathers of various educational backgrounds ($P: .000$). The findings obtained through Post Hoc Tests (Scheffe) analyses illustrate that significant differences exist concerning CT scores of the participants having fathers with various education levels. We first compared CT results of the participants with primary school education

level fathers to the scores of the participants with secondary, high school and university level fathers. We find a significant difference in CT scores of the participants with high school and university education backgrounds. The CT scores comparison of the participants with secondary school level education background to those of participants with primary, high school and university graduate fathers show us that there is a significant difference in the participants with university graduate fathers. When the CT scores of the participants with high school graduate fathers are compared to those of participants with primary, secondary and university graduate, a significant difference is found in CT outcome of the participants with fathers of primary and university education. The comparison of the CT scores of the participants with university graduate fathers to those of participants with primary, secondary and high school education reveals that there is a significant difference in primary, secondary and high school level.

As depicted in Table 4.18, number of siblings in the family has an effect on the total CT scores of our participants. While CT scores mean of the participants who are the only child in their family is 74,25, this figure is 68,37 for those with one sibling. However, participants having siblings between two and five have obtained a lower CT score mean, 61,67. Similarly, participants with six or more siblings have performed the weakest in terms of CT score mean, 53, 94. To find out if the CT averages of the groups were different from each other, one-way ANOVA analysis was applied. The outcome of this analysis demonstrated that there were significant differences among the groups ($P: ,000$). The results received from Post Hoc Tests (Scheffe) analyses

reveal that there are significant differences among participants with various number of siblings. For example, when the CT results of the participants that are the only children of their families are compared to those of the participants having one sibling, between two and five, and six and more siblings, we see a significant difference in participants having siblings between two-five and six and more. The comparison of the CT scores of the participants with one sibling to the participants being the only children of their families, having siblings between two and five, and six and more, indicate that there is a significant difference in participants having siblings between two to five or six and more. The CT scores comparison of the participants with two- five siblings to those of being the only child, having one sibling and six or more siblings show that there exists a significant difference in the scores of the participants being the only children, having one sibling and six or more siblings. When we compare the CT scores of the participants with six and more siblings to those of being the only children, having one sibling and between two and five siblings, we find a significant difference in participants being the only children and having one sibling, and between two and five.

We can infer from the overall findings displayed in Table 4.18 that while owning a private study room at home has not influenced general CT scores of the participants, other variables such as owning a private room, reading daily newspapers, being computer literate, having a higher level of parental education as well as number of siblings in the family seem to have an effect on the degree of possessing the qualities of a strong critical thinker besides the language proficiency variable. The results found in this study

compare favorably to findings in earlier research studies, for instance, Abdullah's (1997) results, specifically regarding the importance of parental educational background and the effect of the number of "people in the homes" (p. 15) in the development of critical thinking.

4.5 An overall look at the findings

The findings of this study suggest that having an experience of learning a second language has a great impact on the growth of critical thinking ability. The data seem to support all our hypotheses. Firstly, we found a statistically significant difference between the level of second language proficiency and critical thinking ability (H1). In other words, the more proficient the participants were, the higher critical thinking scores they obtained on the they took.

It was depicted in H2 that participants would perform dissimilarly on the subsets of the WGCTA. The participants, regardless of their proficiency level, performed far better in the evaluation of arguments (CT5) and interpretation (CT4); whereas, they all tended to perform poorly particularly in the inference (CT1) subsection of WGCTA.

For H3, there existed a relationship between the SES levels and the critical thinking of the participants. Specifically, the parental education level and the number of siblings seemed to have an effect on the critical thinking ability. In other words, the participants whose parents had a university degree were among the strongest critical thinkers, and those whose parents were not

educated as such and that had six or more siblings were among the least well ones.

H4 claims that the critical thinking ability of Turkish and American university students differ. We found a difference. The means of the critical thinking scores of the Turkish participants were slightly higher than those of their American peers. However, we have no strong support for the reasons of this difference between their performances due to the lack SES and information regarding the level of education of the American group.



CHAPTER V

CONCLUSION

5.1 Introduction

This dissertation focuses mainly on the relationship between proficiency in a foreign language and critical thinking skills. The features investigated in this study also include some SES variables such as the participants' family background and its impact on the participants' critical thinking skills.

To investigate these issues, we utilized three tasks, namely WGCTA, MTELP and PBIQ. For this specific purpose, we first translated the WGCTA into Turkish in order to eliminate any possible language barriers our participants, may have encountered. We also adapted some cultural elements unique to the American society. As for the second task, we administered a standard language proficiency test, MTELP (Form Q) with the aim of determining the English language proficiency level of the participants. Finally, we utilized a self-developed questionnaire named PBIQ, in which we gathered information regarding the socio-economic level of the participants. In Section 5.2, we will discuss the concluding remarks. Section 5.3 will be about the implications of the study, and in Section 5.4, we will present our suggestions for further research.

5.2 Concluding remarks

Within the framework of these specific features, we tried to evaluate the hypotheses proposed for our study (see section 1.4) and found that proficiency in a second language, English in our case, had an impact on the critical thinking of our participants. This may have resulted from the language learning strategies they have employed in the language learning process. Due to their past experience with languages, our L2 learners were found to be significantly better critical thinkers when compared to their monolingual peers. Our finding is supported by Fisher & Scriven (1997) who focus on abilities second language learners display, such as identifying and communicating on things like shifts in meaning, vagueness in a term, errors in deductions, etc. and they do it without having factual knowledge. Fisher & Scriven further state that when learners exhibit the ability to select errors in reasoning, they are basically performing critical thinking. Moreover, Chamot & Kupper (1989) concluded in their study that “students of all levels and abilities use strategies when working with a foreign language” (p.21). Chamot & Kupper also conclude that use of strategies effectively would contribute to success in language learning. Therefore, language learning process, which engages the learner in cognitive strategies such as inferencing, deducting, testing hypothesis, and the like, may result in an increase of critical thinking ability of second language learners as these strategies correspond to the subsets of the WGCTA, namely, inference, recognition of assumptions, deduction, interpretation and evaluation of arguments.

Besides effects of English proficiency on critical thinking, our study also revealed that participants' SES background was a factor that contributed to their critical thinking positively. As was stated in section 2.13, Cheung (2001) found that class background may indirectly have an impact on the student's academic performance as well as critical thinking. Moreover, as mentioned in section 2.13, Abdullah (1997) found that among the SES variables parental educational level seemed to have played a role in the critical thinking scores of the participants. Cheung's research (2001) also has supportive findings regarding this independent variable. Namely, students of high SES background performed far better in critical thinking skills than those of in lower SES backgrounds. Furthermore, Siegel (1991) has demonstrated that children who came from poor homes where parents had little education, usually did less well on problem-solving and thinking activities than those children who came from more privileged homes.

In conclusion, our findings have received support regarding second language proficiency and its impact on critical thinking skills. We finally found that the participants' critical skills were influenced by the characteristics of their family background.

5.3 Implications for ELT

The ability to think critically is considered as a major goal of academic instruction in general. This ability is also acknowledged to play an important role in many kinds of careers in which thinking analytically is an important part of the job. As was stated previously, the 21st is the era of knowledge as well as the era of

electronics. In order to cope with the 'rapidly changing' world and its demands, our students in the ELT departments, trained to become the language teachers responsible of our future generations should be, first of all, trained to be strong critical thinkers themselves so that they would continue training their own prospective students keeping in mind this important mission of teaching critical thinking skills. As indicated in the review of literature in Chapter II, critical thinking can be taught utilizing various of thinking programs and instructional strategies. Teacher education programs must primarily aim at training would-be teachers through instructional strategies designed to enhance critical thinking abilities so that they would be equipped with the essential skills and instructional strategies to educate and prepare the next generations, the future of our society. In order to help our students to compete with the people of other developed countries in the field of knowledge and advanced technology, we must properly educate them to fully utilize critical thinking and hence become critical thinkers.

Our findings demonstrated that participants of high level of second language proficiency and high SES background, displayed far better critical thinking abilities than those with lower level second language proficiency. Since we are unable to change the SES of our students, we must consider of other methods to foster their critical thinking. The findings of our study revealed that our students scored poorly on inference (CT1) component of the WGCTA. This subset was observed to be the weakest component in all the groups. However, the advanced group, AG, exhibited the highest in this subset as well as the rest of the other modules. The reason for this would be the existent of some courses offered in the ELT curriculum such as, study skills course and language learning

strategies. Ekmekçi (1994) maintains that to be academically successful, university students should be made aware of the importance of study skills. She furthermore expresses that among the most important academic skills are "...interpreting graphs, ...making inferencing, drawing conclusions"(p.11). Despite the fact that ELT participants received language training, they still seemed to be poor performers at particularly inferencing ability. We can suggest that more emphasis is given in this area order to strengthen this important skill.

5.4 Suggestions for further research

This study was conducted with adult participants only. Since the WGCTA is developed to measure critical thinking of individuals ranging from grade 4 to college students and adults, a further study aimed at measuring critical thinking of pupils in primary schools can be conducted. For example, the population of the study could be selected from various schools across the country and data regarding teacher behaviors could be investigated as well to find out which teacher characteristics would help to promote the ability to think critically. Furthermore, studies examining the impact of critical thinking on the four skills, namely listening and speaking, reading and writing could also be carried out.

This study could also have been conducted with subjects majoring in other languages, such as French and German. We could then see if knowing a second language would also have an impact on critical thinking.

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APPENDIX

Sevgili Öğrenciler,

Doktora tez çalışmamda kullanmak üzere aşağıdaki formda siz ve ailenizle ilgili bilgilere ihtiyacım vardır. Formu dikkatli ve doğru olarak doldurmanızı rica ederim.

Teşekkürler.

KATILIMCI BİLGİ FORMU

ADI/ SOYADI _____

DOĞUM YERİ /YILI _____

ANADİLİNİZ _____

CİNSİYETİNİZ : () BAY () BAYAN

MEZUN OLDUĞUNUZ LİSE : _____

ORTA ÖĞRETİM / LİSEDE HAZIRLIK OKUDUNUZ MU ? () EVET () HAYIR

ÜNİVERSİTEDE HAZIRLIK OKUDUNUZ MU ? () EVET () HAYIR

EVDE SİZE AİT ÇALIŞMA ODASI : () VAR () YOK

GÜNLÜK GAZETE/DERGİ OKUR MUSUNUZ? () EVET () HAYIR

YURT DIŞINDA BULUNDUNUZ MU? () EVET SÜRE _____ ÜLKE _____
() HAYIR

BİLDİĞİNİZ BİLGİSAYAR YAZILIMLARI: () Word () Excell () Powerpoint () Yok
() Diğer

AİLENİZİN EĞİTİM DURUMU

ANNE: () İlkokul () Ortaokul () Lise () Üniversite () Lisansüstü

BABA : () İlkokul () Ortaokul () Lise () Üniversite () Lisansüstü

KARDEŞLERİNİZİN SAYISI : () KIZ () ERKEK () YOK

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 1978 - 1983 University of Çukurova (BA)
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LANGUAGES : Turkish (Native), English, Arabic (Spoken)

ACADEMIC AWARDS AND HONORS

Turkish Ministry of National Education, Teaching Certificate, 1982

BA Honors Degree in English Language Teaching, Diploma, Çukurova University, Adana, 1983

Fulbright Summer Course for English Teachers, Certificate , Robert College - Istanbul, 1985

British Council Summer Course in Teaching English as a Foreign Language, University of Leeds, England, 1987

Summer Graduate Course on Second Language Acquisition at Southern Illinois University , Carbondale, Illinois, USA, June 8- August 8 1991

Turkish Ministry of Tourism, Professional Tour Guide, Certificate, Adana, 1992

British Council, CEELT (Cambridge Examination for English Language Teachers), Cambridge University, Certificate, Adana , November 1992

British Council, DIPELT (Diploma in English Language Teaching), Cambridge University, Certificate, Adana, November 1994

USIS (United States Information Service), Summer Institute Certificate, Robert College, İstanbul, July 1995

Utrecht University, Graduate School of Linguistics
The Netherlands, LOT Summer School, Certificate, Utrecht, June 1998

Amsterdam University, Graduate School of Linguistics
The Netherlands, LOT Winter School, Certificate, January 1999

VOCATIONAL EXPERIENCE

- 1984 - 1987 : Lecturer, Erciyes University, Department of Foreign Languages, Kayseri
- Summer 1985 : Attended Intensive Language Summer Course, Grant awarded by Fulbright & USIS
- Summer 1986 : Went to England and spent three months in Cambridge at Emmanuel College, and did research on English Language and Linguistics at the University Library
- 1987-Pres : Lecturer, Çukurova University, English Language Department
- August 1988 : Attended the Fourth International Conference on Turkish Linguistics at Middle East Technical

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1989 : Taught English to the Turkish staff at BOTAŞ, Ceyhan

1991-1997 : Taught English at Turkish - American Association,
Adana

Feb. 1- July 1, 1992 : Instructor at an in-service ELT program for science and
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1992 - 1993 : Instructor at an in-service ELT program for science and
math teachers in Adana organized by the Turkish
Ministry of Education

July 1996 – 1997 : Volunteer tutor in Turkish and part-time translator at the
American Consulate, Adana

COURSES OFFERED AT ERCIYES UNIVERSITY

PREPARATORY SCHOOL

General English to Students of Faculty of Medicine, and Faculty of
Economics and Administration

FACULTY OF MEDICINE

Medical English to Students of Medicine Faculty

COURSES OFFERED AT CUKUROVA UNIVERSITY

Undergraduate Courses at English Language Education Department
(1987-pres.)

Writing I and II
Reading I and II

Listening and Speaking I and II
 Study Skills I and II
 Structure of English I and II
 Introduction to Linguistics I and II
 Grammar I and II
 Research Methods I and II
 Composition I and II
 Phonetics I and II
 Mythology I
 Translation – Turkish to English and English to Turkish
 Culture I

PROFESSIONAL PAPERS AND PRESENTATIONS

“The History of Foreign Words in English and Turkish” Çukurova University,
 January, 1988

“Games in the Teaching of English” Çukurova University, November, 1989

“Using Newspapers in the Classrooms” Çukurova University – USIS, ELT
 Conference, (in collaboration with Cem Can) February 11 -13, 1993

“Lingua-Franca” Tarsus College, Tarsus-Mersin (in collaboration with Cem
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March 14, 1993

“The Role of Reading Upon the Writing Skills” (to be published)

OTHER INTERESTS

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